FEDERAL INFORMATION SYSTEMS AND SERVICES MARKET, 1992-1997

INPUT

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Federal Information Systems and Services Market, 1992-1997

Abstract

According to this report, *Federal Information Systems and Services Market, 1992-1997*, the federal market demand for vendor furnished information systems and services will increase from $17.8 billion spent in FY 1992 to $24.3 billion in FY 1997 at a compound annual growth rate of 7%.

The federal market will become increasingly competitive in response to a declining defense budget and major civil program delays. Agencies need connectivity, data portability, data base interchange and standardization at lower overall cost. Under the aegis of the Corporate Information Management initiative, the Department of Defense will acquire fewer new systems, while downsizing, updating and re-engineering business functions and the information systems that will support them.

Vendors in this market need to follow a constantly changing schedule of priorities, especially in view of the potential impact of the presidential and congressional elections.

This report analyzes the trends expressed in the FY 1993 information technology (IT) budget requests. Based on interviews with agency officials and recent long-range IT plans, it forecasts likely trends in technology, acquisition processes and regulations. The report also notes key program developments that will shape the size and direction of this important marketplace.

This report contains 130 pages, including 47 exhibits.

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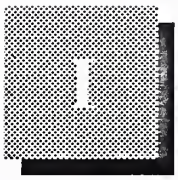

Introduction

This report, *Federal Information Systems and Services Market, 1992-1997,* is produced by INPUT as part of the Federal Systems and Services Market Program (FSSMP). This report forecasts information technology expenditures by the U.S. federal government for fiscal years 1992 through 1997 and includes analysis of the federal information technology budget submitted for fiscal 1993.

FSSMP—and its predecessor, the Federal Information Systems and Services Program (FISSP)—was initiated by INPUT for information industry clients in the federal government market, which is estimated will increase to about $24 billion in 1997, excluding classified systems.

Since the program began, INPUT annually asked interested clients to identify specific business areas, service modes and issues they consider essential for their federal market planning. Their suggestions were incorporated into FSSMP, and led to selection of this report and the service mode reports as appropriate vehicles for providing the information.

INPUT does not detail the full spectrum of information systems and services opportunities in each fiscal year because there are more than 35,000 individual procurements annually. Instead, FSSMP examines the driving factors and establishes the basis for forecasting individual service mode growth prospects.

The companion Federal Information Technology Procurement Program (FITPP) focuses on only those opportunities of significant new or recompete interest to INPUT's vendor clients. These are provided in the *Procurement Analysis Reports* data base issued monthly. The FSSMP market analysis reports provide more fiscal-year detail and trends by delivery mode and agency.

A
Scope

This report covers only the U.S. federal government market and includes only those expenditures expected of the executive branch agencies.

The major service modes included in this report are:

- Processing services
- Software products
- Professional services
- Systems integration
- Outsourcing (includes systems operations)
- Turnkey systems
- Equipment systems (furnished without systems design, applications software or communications services) and maintenance
- Communications and network services

The service modes are defined in Appendix B. The definitions were revised in 1992 to clarify some subsets of the service modes.

Several of these subsets are also identified as special delivery modes, in response to client requests. The expenditures identified are part of the service modes above, and therefore not additive to them.

- Electronic commerce/EDI
- Office information systems
- Computer equipment maintenance
- Computer security

Funding information is rounded to the nearest 100 million dollars, unless the amount is much less than billions of dollars. Then the information is rounded to the nearest five million dollars. The information should not be interpreted to imply accuracy to that degree. In general, the funding information is initially derived from plans and budget requests not approved by Congress or confirmed by OMB, and may change even after approval. These changes may be dictated by the Administration or subsequent Congressional action.

B
Methodology

The Office of Management and Budget (OMB)/General Services Administration (GSA)/National Institute of Standards and Technology (NIST) document, *Five-Year Plan for Meeting the Automatic Data Processing and Telecommunications Needs of the Federal Government,* and the federal agency OMB Circular A-11, Sections 43A&B *Information Technology Budget Requests* were analyzed to identify key expenditures in the service modes described above.

Since agencies are not required to submit supporting data for plans to OMB, additional documentation on their OMB A-11 submissions and long-range *Information Resource Management Plans* was requested from the agencies and reviewed for guidance on the forecast.

Interviews with agency policy and procurement officials were conducted to identify technology trends, policy changes and issues associated with plans to improve federal information resources and the acquisition process. Additional information on published policies and regulations is included. The Congressional Budget Office's *Economic and Budget Outlook for Fiscal Years 1993-1997* was also examined for economic assumptions.

The section on market trends was prepared after the interviews and research on the current information technology budget submission was completed.

The INPUT forecast of five fiscal years' growth, by service mode, is based on the OMB A-11 Section 43 budget requests and off-budget plans under various federal funds and for public corporations.

The economic factors for the five years are established by INPUT under the Market Analysis Program (MAP) and employed for all INPUT program forecasts. The growth guidelines are developed from annual INPUT surveys of users (including government) and vendors, and INPUT-developed models. The growth rates used for this forecast are indicated in Table I-1.

TABLE I-1

1993 GDP and Inflation Growth Rate

Overall Avg.	1992E	1993E	1994E	1995E	1996E	1997E	Percent '92-'97
Nominal GDP	5.3	6.2	6.7	6.1	6.1	5.9	6.2
GDP Deflator	2.9	3.2	3.6	3.7	3.6	3.6	3.5
Real GDP	2.4	3.0	3.0	2.3	2.4	2.2	2.6

C
Report Organization

In addition to this introduction, this report has been organized as follows:

II Executive Overview
III Market Trend Analysis
IV Market Forecast
Appendixes
- A. Forecast Data Base and Reconciliation
- B. Definitions
- C. Glossary of Federal Acronyms
- D. Policies, Regulations, and Standards

D
Related INPUT Reports

Federal Information Technology Procurement Program, Procurement Analysis Reports

Defense CIM Information Services Market

Federal Computer Security Market, 1992-1997

Federal High-Performance Computing Market

Federal Telecommunications Market, 1992-1997

Federal Agency Recompete Practices

Federal Electronic Commerce/EDI Market

Federal Electronic Imaging Markets, 1991-1996

Federal Geographic Information Systems Market, 1991-1996

Federal Computer Equipment Market, 1991-1996

Federal Professional Services Market, 1991-1996

Federal Network Management Market, 1991-1996

Federal Software and Related Services Market, 1991-1996

Federal Systems Integration Market, 1991-1996

Federal Market Issues, 1991:
- *Uncompensated Overtime*
- *Federal 8(a) Programs*
- *Federal Anti-Drug Program*
- *GSA Schedule Practices*

Federal Equipment Maintenance Market, 1990-1995

Federal Financial Systems Market, 1990-1995

Federal Education and Training Market, 1990-1995

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II

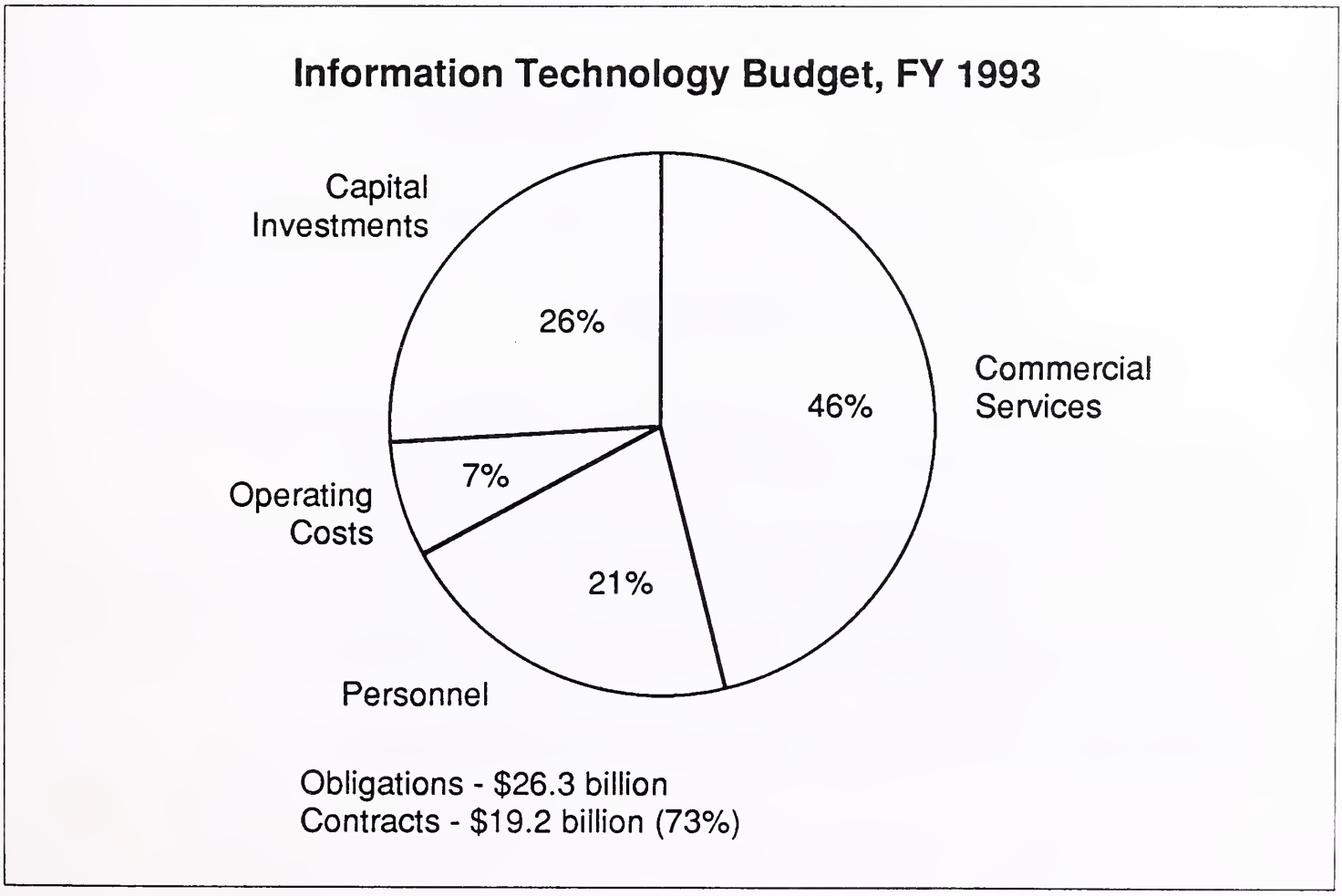
Executive Overview

A

Information Technology Budget, FY 1993

The proposed fiscal year 1993 Federal Executive Branch Information Technology budget of $26.3 billion represents a 7% increase over the FY 1992 approved budget. Exhibit II-1 illustrates the division of the budget among the four primary components: commercial services, personnel, capital investments and operating costs.

EXHIBIT II-1



For fiscal year 1993, 73% of the budget is proposed for expenditure on contracts for systems and services, slightly higher than the level proposed in FY 1991 and FY 1992.

- All of the commercial services segment will be spent on contracts for telecommunications and network services, processing, maintenance and professional services. This amount is more than $945 million higher than in FY 1992.
- Ninety-three percent of the proposed capital investment segment will be spent on ADP and communications hardware and software. In FY 1993, the amount budgeted is $693 million higher than 1992.
- Operating costs, which include equipment and software leases, are expected to decrease from 9% of the budget last year to 7% in FY 1993, or only about $180 million more.
- Personnel costs for in-house staff, travel, etc. are projected to be a slightly smaller proportion (21%) than in FY 1992, an increase of only $140 million.

This data is a summation and analysis of the individual executive branch agencies' budgets submitted under OMB Circular A-11, Section 43, including revisions through August 1992.

B
Information Technology Markets

INPUT reviewed the changes in budget request documentation to identify the key areas affected. FY 1993 shows some of the increase found in FY 1992 will not be repeated in the out years. INPUT's forecast of the market takes this into account. Growth rates over the 1995-1997 period will more closely resemble those of 1990.

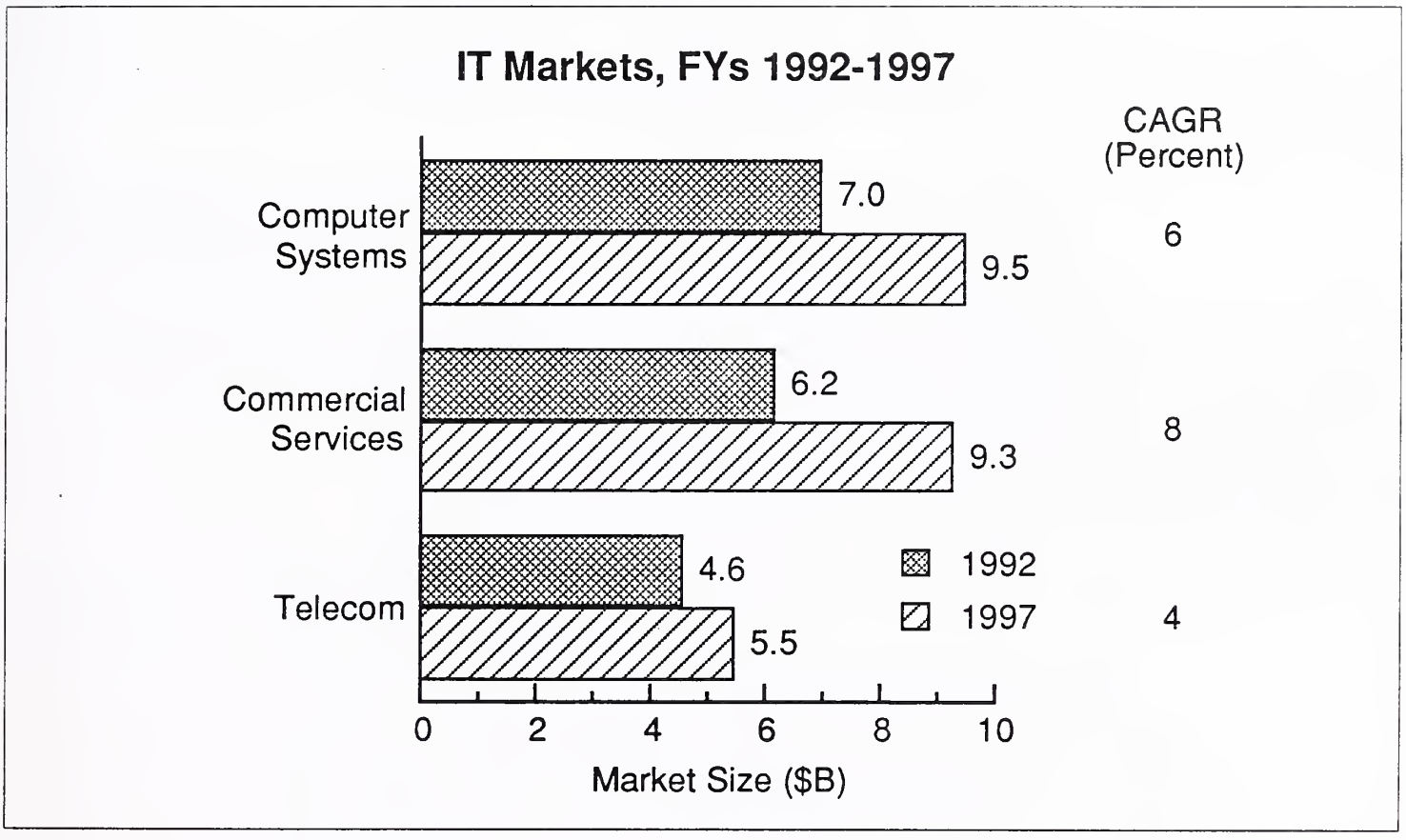
The information technology market available to vendors is expected to increase from $17.8 billion in FY 1992 to $24.3 billion in FY 1997, a compound annual growth rate (CAGR) of only 7%.

This forecast includes the proposed IT budget estimates of agencies not required to file OMB Policy A-11 Section 43A&B and several off-budget expenditures of agencies such as the U.S. Postal Service, and other public corporations. It excludes classified systems and legislative and judicial acquisitions.

The potential future impact of mandatory Gramm-Rudman-Hollings Act budget cuts, Defense Management Improvement Initiatives (Corporate Information Management) or cuts in the National Space Program, has not been considered in this forecast beyond those projected by the Congressional Budget Office and OMB. These changes could reduce out-year expenditures by $4-$6 billion per year.

There are three principal components of the contract portion of the proposed federal agencies' IT expenditures, as shown in Exhibit II-2:

EXHIBIT II-2



- Commercial services activities are the largest component, increasing from $6.2 billion to $9.3 billion by FY 1997 at a CAGR of 8%, down from earlier forecasts, primarily as the result of program cancellations and out-year reductions. The actual requests for 1993 are lower, with gradual increases in expenditures in FY 1994 to FY 1997 expected.

- Computer systems, which include hardware and systems software, should grow from $7.0 billion to $9.5 billion at a CAGR of 6%. The most significant increases appear in FY 1993 and FY 1994, with approval and award of several large systems contracts and upgrade of a

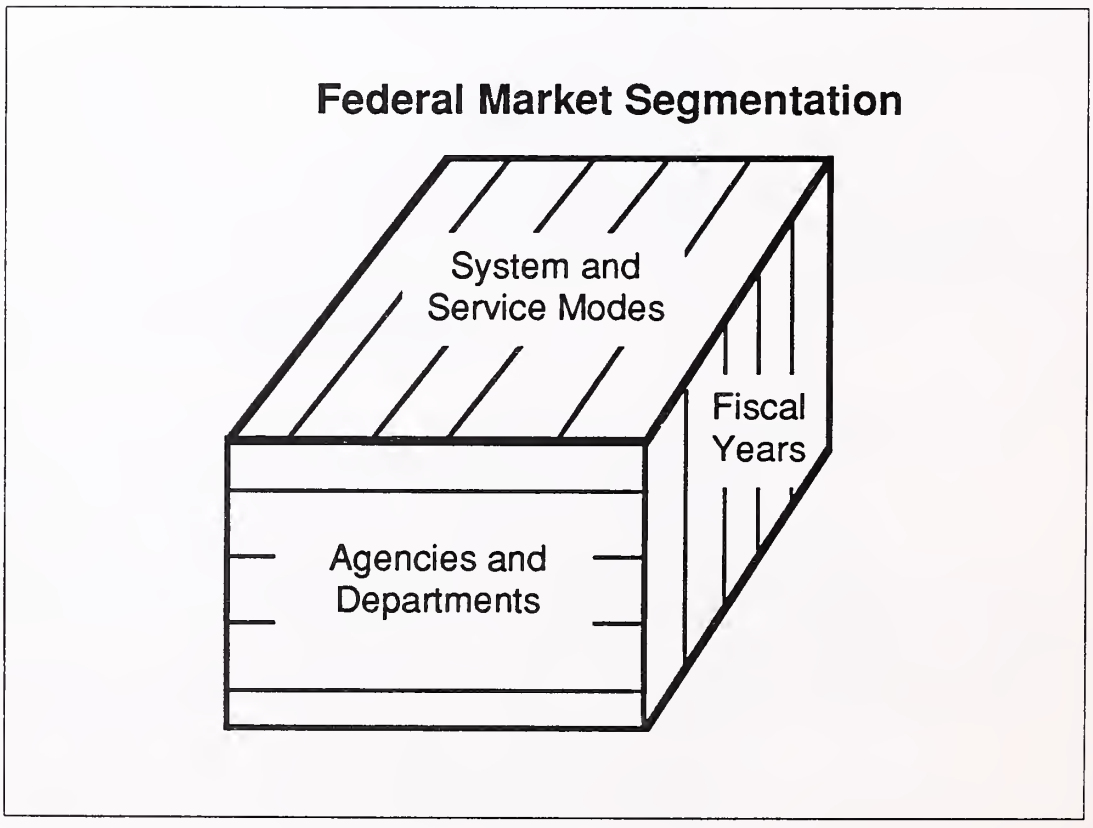
number of essential systems. Growth over the following three years will be down slightly from the earlier forecasts, reflecting lower hardware costs and an increased number of system upgrades rather than complete replacements.

- Communications and network services expenditures are projected to increase from $4.6 billion in FY 1992 to $5.5 billion at a CAGR of 4%, reflecting a larger base year and lower growth rate than seen in the FY 1989 to FY 1991 forecasts. These amounts appear to be substantially less than the often-quoted $25 billion by Congress, but undocumented in federal budgets. One could presume that more is being spent out of operations funds than publicly admitted.

C
Federal Market Segmentation

One difficulty of collecting and interpreting federal information technology budgets is the different terminology applied by operating personnel, administrators, legislators and budget specialists. Based on earlier industry studies, INPUT employs service modes to describe market conditions. INPUT added system modes to comply with OMB/GSA-derived budgetary information, as indicated in Exhibit II-3. Individual mode funding trends are discussed in Chapter III.

EXHIBIT II-3



The OMB/GSA *Five-Year Plan of Major Information Systems and Services Projects* describes projects in user-functional modes: new, replacement or expanded systems, or operation, lease and maintenance of software and systems. The individual mode trends are detailed in Chapter III. Some modes are subsets of the primary modes, to clarify expected spending patterns; the funding details of the principal modes are described in Chapter IV.

Both service/system modes and user-functional modes identify the requested budget in the fiscal years of proposed obligation, which permits development of a common base of proposed outlays for either set of modes by fiscal year.

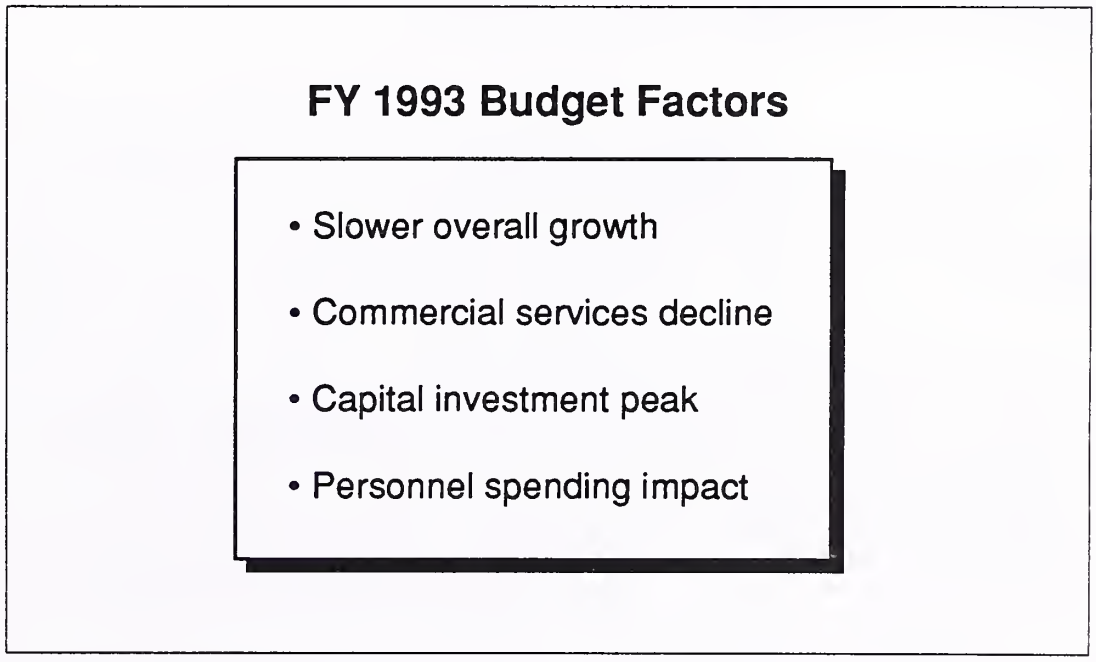
The 1992 series of INPUT services and systems modes are defined in detail in Appendix B of this report.

D

Federal Budget Issues

For several years there have been signs that the economy could not support constantly expanding government discretionary expenditures, in opposition to burgeoning entitlements. The demise of our primary military threat and fading space challenge lent themselves to demands that the deficit and its debt implications be controlled. Slower overall budget growth and the resultant reduction in outlays for good and services can be expected throughout the remainder of the decade, as noted in Exhibit II-4.

EXHIBIT II-4



Several factors are driving a near-term decline in demand for commercial services: demand for new equipment and systems, increased leases of hardware and software, pressure to retain the current federal ADP staffs and downsizing in a number of agencies, particularly Defense. While industry suggests that it would be more cost effective to have contractors perform most information services functions, the political atmosphere, especially in the House, is not likely to permit significant growth beyond 75% of the IT budget.

The need to replace obsolete equipment and to provide more managers and services personnel with the latest and most efficient equipment and software is pushing capital investment funding to new levels. This funding includes expenditures for high-performance computing and communications. Public demand for improved agency responsiveness will support the peak through 1994.

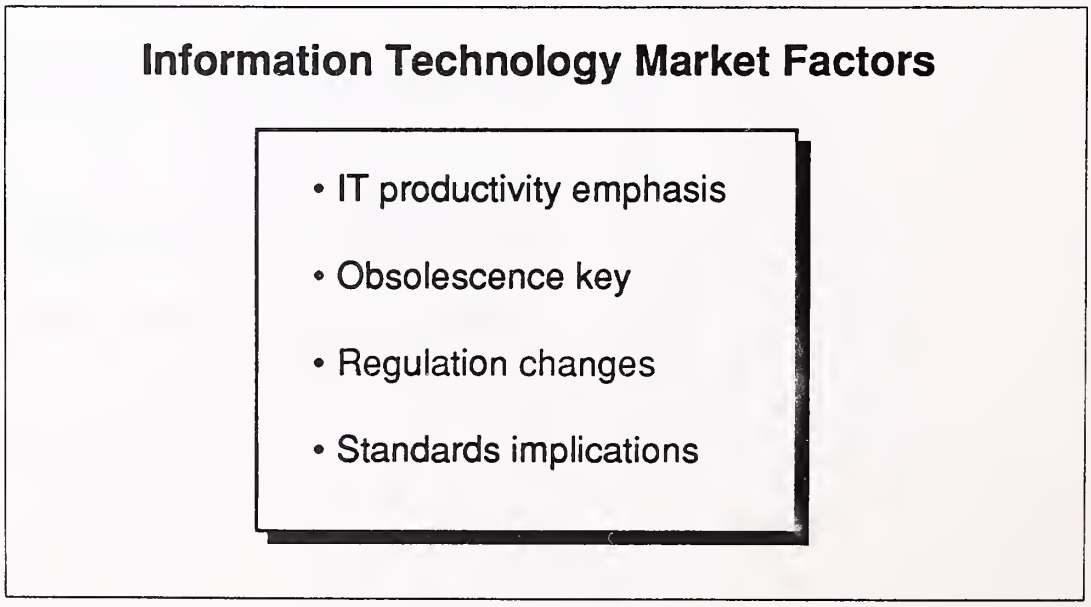
Spending on government personnel is down again. Part of the reduction is based on Defense plans to downsize its major Information Processing Centers and Critical Design Areas, and general downsizing to distributed systems in many other agencies.

But the reduction is not expected to provide opportunities for contractors, because the demand for IS personnel is diminishing. This is also an indication of the extent of government plans to move more of the process into the users' hands.

E
Information Technology Market Factors

Several factors, identified in Exhibit II-5, are impacting the growth rate and direction of the federal government market for information technology products and services.

EXHIBIT II-5



Faced with the dilemma of meeting increasing public demands for service without the high expense of more staff, agencies are looking to substantial improvements in IT productivity. This means faster throughput, fewer or the same personnel, and the move of information services to those interfacing the public and Congress. Improved connectivity, data interchange, and functionally re-engineered agency functions are being emphasized.

Meeting these needs requires replacement of older and less flexible systems, and the interfacing of currently standalone systems to enhance the speed of data interchange. The core of federal computing power lies in midsized machines that are 12-13 years old and nearly two generations behind today's IT. Over the next half decade these machines must be replaced.

As noted previously, changes in the regulations aimed at improving and accelerating the acquisition process appear to worsen the process. Improvements in procurement rules take an inordinate time to reach lower-level contracting offices and some conditions are applied to contracts that do not require them. Agencies are increasingly critical of Congressional and Administration efforts to micromanage with old methods.

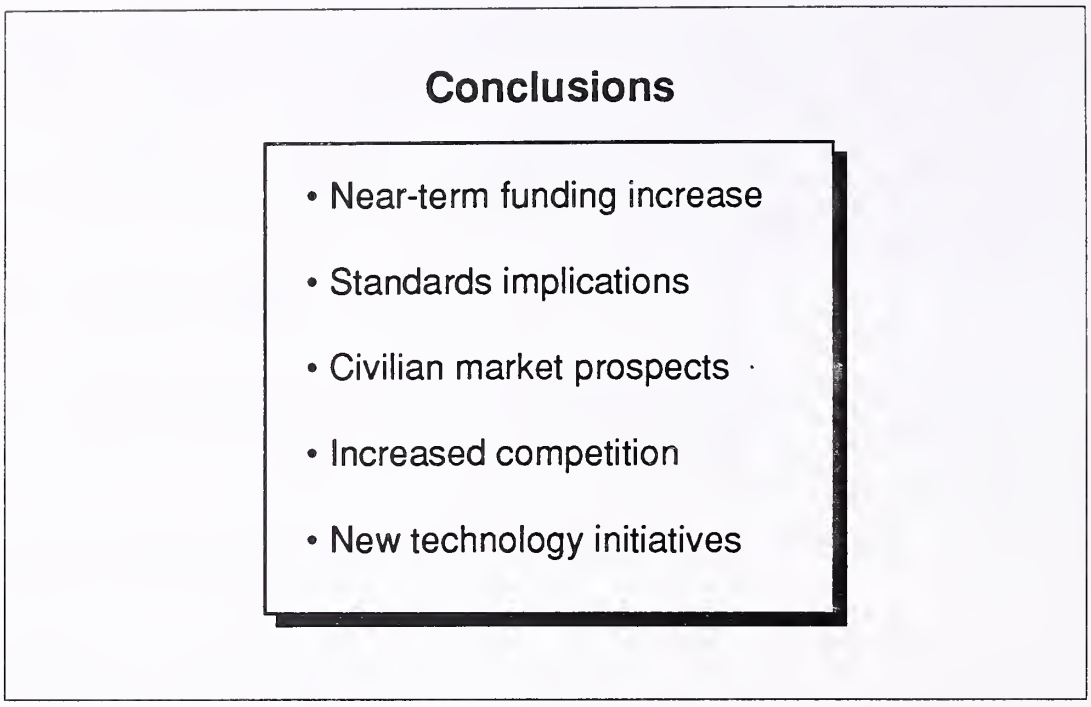
After years of indecision, civil agencies are imposing across-the-board standards such as GOSIP, POSIX and security. Defense is moving toward these, except in the area of protocols where a conflict exists in the current Defense Communications System. Under NIST guidance, the government expects these changes to lead to improved connectivity, software portability and data base interchange.

F
Conclusions

Governmentwide information technology priorities are changing in this decade, with the prospect of significant impact on the way information resources will be acquired and the response of the industry. The most important conclusions are listed in Exhibit II-6.

The beginning of the 1990s saw a gradual decline in the growth rate of IT acquisition, so the FY 1992 budget request came as a surprise, as it moved toward greater near-term expenditures than had been expected. Several key contracts were awarded in FY 1992, with significant out-year spending, and new programs have been suggested that could be funded in FYs 1993-1994. The out years beyond 1995 are expected to exhibit lower rates of growth, about the levels seen in FY 1990.

EXHIBIT II-6

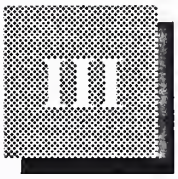


Modification of existing systems is needed to meet standards that improve connectivity, software and data portability, and flexible data base interchange. GOSIP, POSIX and security standards are being more uniformly applied by all agencies. Some unresolved issues remain, such as the conflict of communications protocols, software validation and reuse, software productivity tools and standardized applications packages.

As the demand for lower defense expenditures increases, more attention will be paid to improvements in the civilian agency IT capabilities to collect taxes, improve justice processes and accelerate public service responsiveness. Nearly two-thirds of IT outlays are now in the civil sector, and there is a strong likelihood that this distribution could reach three-quarters of government spending. Civil agencies are also well known for their desire to use the latest state-of-the-art in technology.

The price to be paid by this narrowing range of opportunities is more fiercely bid opportunities, exacerbated by the melding of vendor resources through mergers, acquisitions and alliances. Federal agencies can be expected to demand functional orientation of the solutions offered by vendors and increasing liability for poor or non-performers.

The operational demands on IT require the application of the latest technologies. But, unlike the past, the government is making it clear that it will not pay for development, unless it is a cooperative venture (as in the HPCC Initiative). Instead, industry will be asked to provide new technologies that have been demonstrated in the commercial sector before being offered to the government. While there are suggestions of increasing federal R&D expenditures in IT, the money is not being appropriated by Congress.



Market Trends

A
Federal Market Overview

1. Economic Factors

Geopolitical and financial instability worldwide continue to destabilize the U.S. economy. Democratization of Eastern Europe and the current efforts toward a peaceful settlement of the Mideast crises bolstered demands for drastic reduction of the Defense budget. Added to the fiscal indecision are the concerns with presidential and Congressional elections, which appear to focus on how to increase entitlements with the so-called peace dividend.

The federal budget deficit is not improved by either the Administration or the Gramm-Rudman-Hollings (GRH) Budget Act. Even for FY 1993, the threat of across-the-board outlay cuts under GRH has not produced a politically acceptable budget compromise.

a. FY 1993 Federal Budget

The 1993 budget is slightly reduced, with various out-year impacts on the IT budget. The 1993 budget process was impeded by peace dividend demands, continued savings and loan payments, a threatening bank crash and the depressed economy. The 1992 budget proposed a one-time increase in IT spending, which now has been extended into 1993-1994.

Legislators were advised by the Congressional Budget Office (CBO) that overall federal spending proposed for FY 1993 represents about 25% of the gross domestic product (GDP). The significant factors affecting the spending are the as-yet-unpaid Desert Storm bills, Deposit Insurance payments and increases in the recession-driven benefits programs. The CBO does not expect federal spending to decline to 22% of GDP until at least 1997, when spending will be similar to the late 1970s.

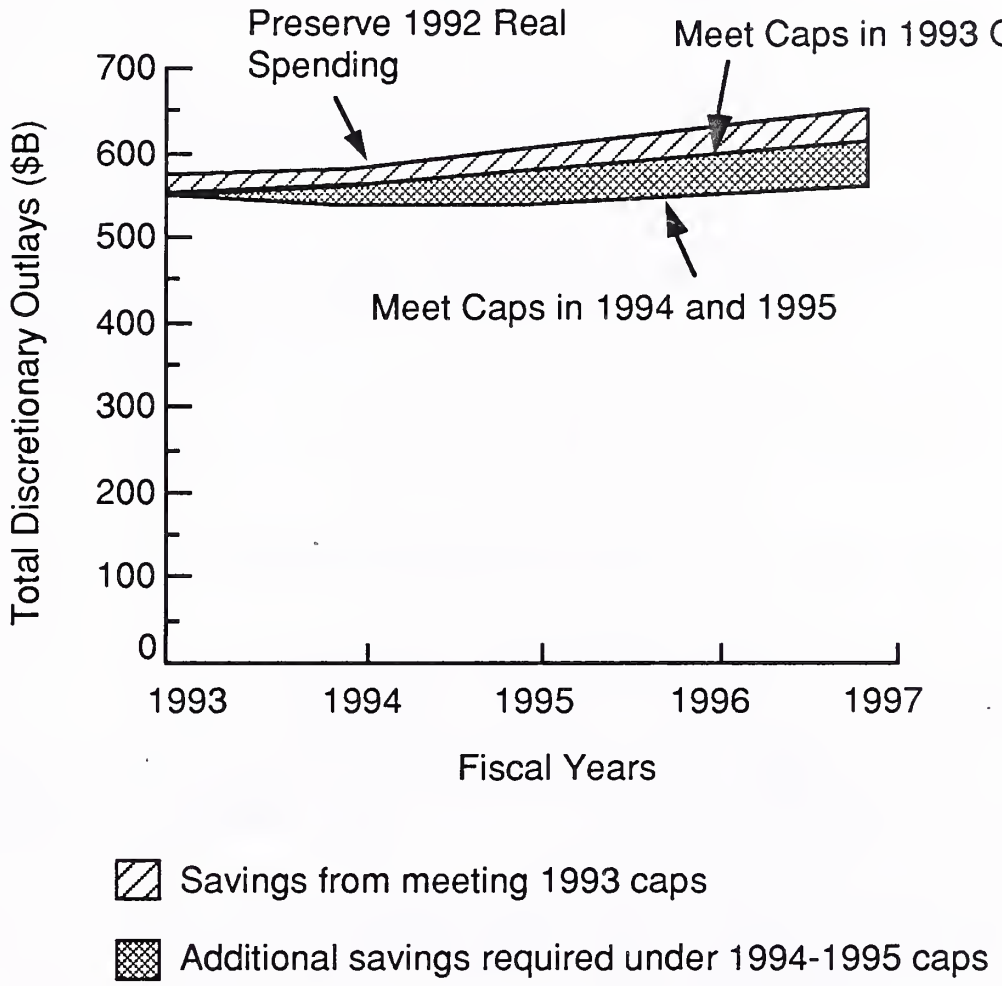
b. Entitlements versus Discretionary Funds

Entitlements are the largest categories of federal spending, now nearly one-fifth greater than the portion of the federal spending in the late 1970s. By 1997, benefit payments could be 70% larger than discretionary spending, unless Congress drastically curtails the eligibility formulas (not under the control of the Administration). Unlike the annually authorized and appropriated discretionary expenditures, entitlements are defined by eligibility, not population size, taxes or Administrative initiatives.

The caps set in the Budget Summit Agreement limited legislative latitude in appropriating funds for domestic programs in 1993. The caps were ratcheted downward by the lower-than-expected inflation, making compliance tough. And after 1993, domestic programs will compete with defense and international programs within a stringent dollar cap, as indicated in Exhibit III-1, from CBO's *The Economic and Budget Outlook, FY 1993-1997.*

EXHIBIT III-1

Required Reductions in Discretionary Spending



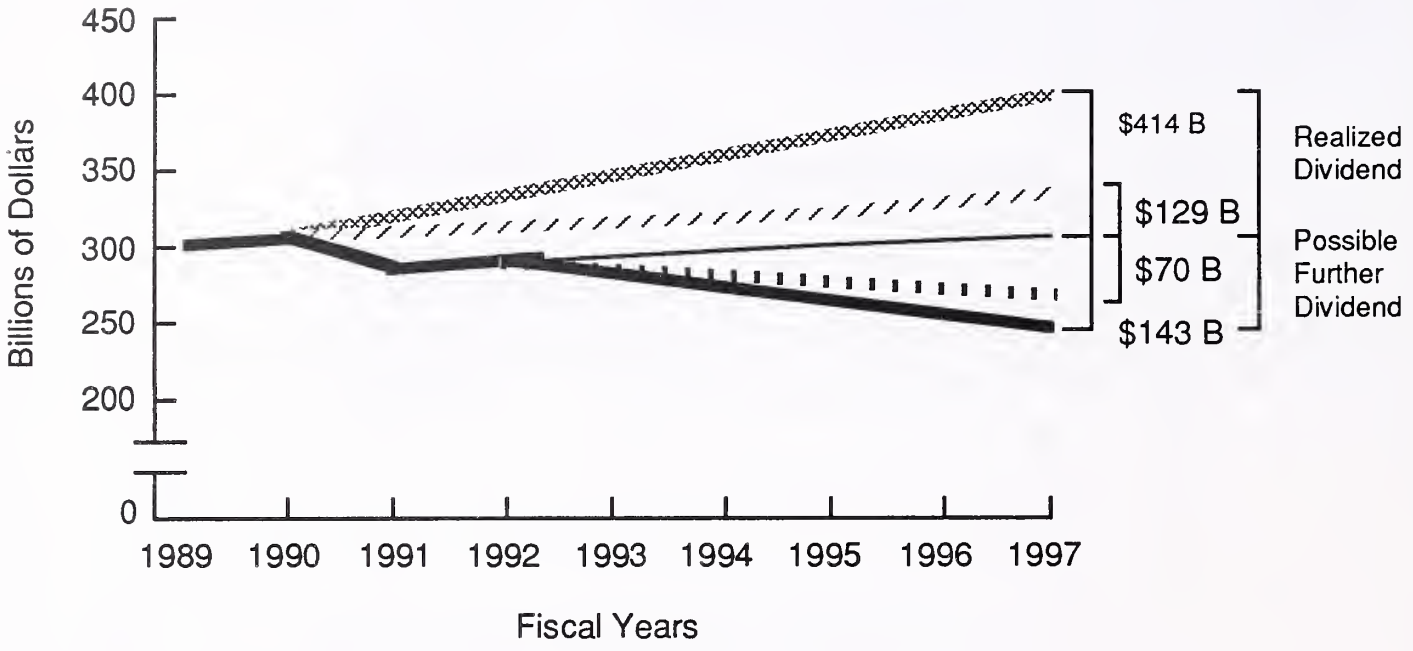
Note: Calculations exclude 1992 spending designated as emergencies.
Source: Congressional Budget Office.

c. Peace Dividends

The CBO also notes that a hefty peace dividend was assumed in current budget projections—driven by the 1990's Budget Summit Agreement. Defense's long-range plan features a smaller and reorganized military force, dubbed the "Base Force." The President's request envisioned $291 billion in expenditures in 1993, inching up to $305 billion in 1997, as noted in Exhibit III-2, also from the CBO report.

EXHIBIT III-2

Measuring the Peace Dividend



Spending Paths:

- Peak cold war (preserve 1990 real spending)
- 3% real reduction through 1995
- President's 1992 budget (base force)
- Reduction to $275 billion in 1997
- Reduction to $250 billion in 1997

Note: Excludes budget authority for Operations Desert Shield and Desert Storm. Peace dividend is measured as cumulative savings through 1997.
Source: Congressional Budget Office.

The alternative trends plotted in Exhibit III-2 indicate the pressure exerted on discretionary spending if no further peace dividends are realized. (Congress declined to authorize the 82 base closings recommended by the Joint Committee just before an election.) Under the 1992 Base Force Budget, some of the IT budget growth anticipated in the civil agencies may not be realized.

If the Defense budget is reduced to $250 billion in 1997, the civil IT programs will proceed as planned, but Defense will decline substantially. Both of these scenarios are based on no new/additional taxes in a slowly growing economy.

The Defense budget reductions of FY 1992 and FY 1993 result primarily in cuts in embedded systems for platforms and weapons deployable for combat, but with relatively small reduction of overall multiyear general-purpose and scientific computing applications.

d. DoD-Corporate Information Management

Beginning in FY 1991, Congress relegated to CIM primary control over Defense general-purpose computing and communications. The plans being published in the form of *Defense Management Review Directives* (DMRD) have not completely defined the impact on industry. For example, DMRD-918, establishes the primary goals of downsizing, integration, software engineering and reuse, and acquisition of stockpiled resources by DITSO.

The savings postulated by the creation of CIM are presumed to come in the form of fewer systems, consolidated communications and less dependence on industry assistance. How this will be accomplished without contractor assistance is not clear at this time.

e. Other Budget Restrictions

NASA's string of technology setbacks with the Hubble Telescope and the shuttle program has placed its IT plans at risk. Both the White House and Congress conducted investigations, which have created more uncertainty and substantial funding delays. The Space Station Freedom and shuttle replacement programs have been substantially reduced.

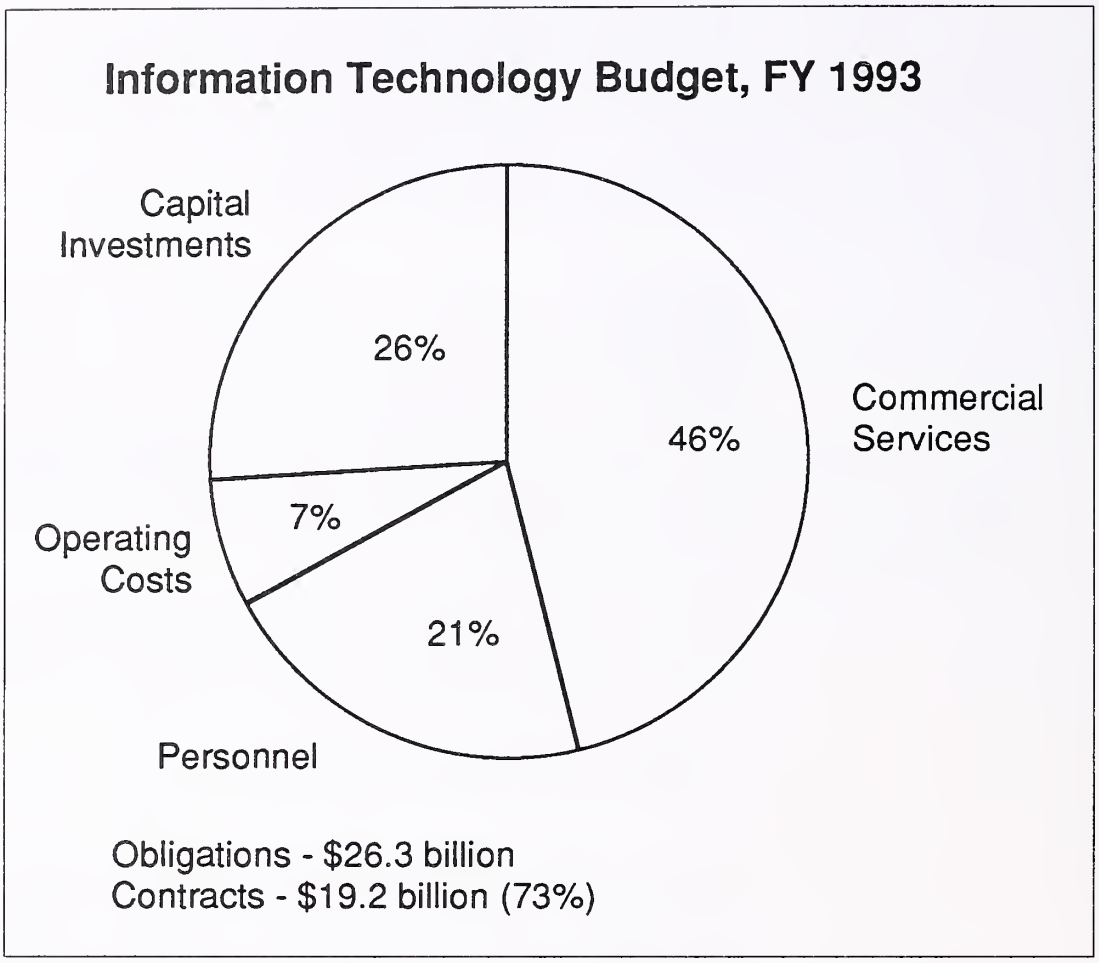
OMB Policy A-76, which recommends government reliance on the private sector for goods and services, is under attack by Congress, with at least three bills in consideration. Congress would create a "contracting-out act" to replace A-76, but with cost comparison and service restrictions aimed at protecting the federal worker base from private sector competition. The House version of the FY 1993 Defense Appropriations Act contained a waiver of A-76 cost comparisons by DoD components, effectively cancelling future conversion opportunities.

The outlook for the next five years is cloudy, but the need for information technology improvements is voiced by both Administration officials and Congress. Any productivity gains expected in the federal sector will depend on re-engineering the processes and replacing inadequate systems.

2. Information Technology Budgets

The IT budget request of $26.36 billion for FY 1992 is an increase of 7% above the $24.64 billion of FY 1992, about half the increase from FY 1991 to FY 1992. As seen in Exhibit III-3, $19.2 billion of the budget could be spent for contracted goods and services.

EXHIBIT III-3



- The proportion of the 1993 budget to be expended on contracts is 73%, more than in FY 1989 to FY 1992, and back to the level of FY 1987. The major part of the expenditure—46% of the overall budget—is planned for commercial services. Commercial-service budget items include network services/telecommunication, processing services, professional services, maintenance, and a new budget element, "Use of Technology." This segment is proposed at $945 million greater than FY 1992.

- Capital investment (CI) has increased to 26% of proposed expenditures, or about $695 million more than requested last year. CI includes:

  - Computer and communications hardware
  - Computer and communications software
  - Physical plant (for the hardware, called "site")

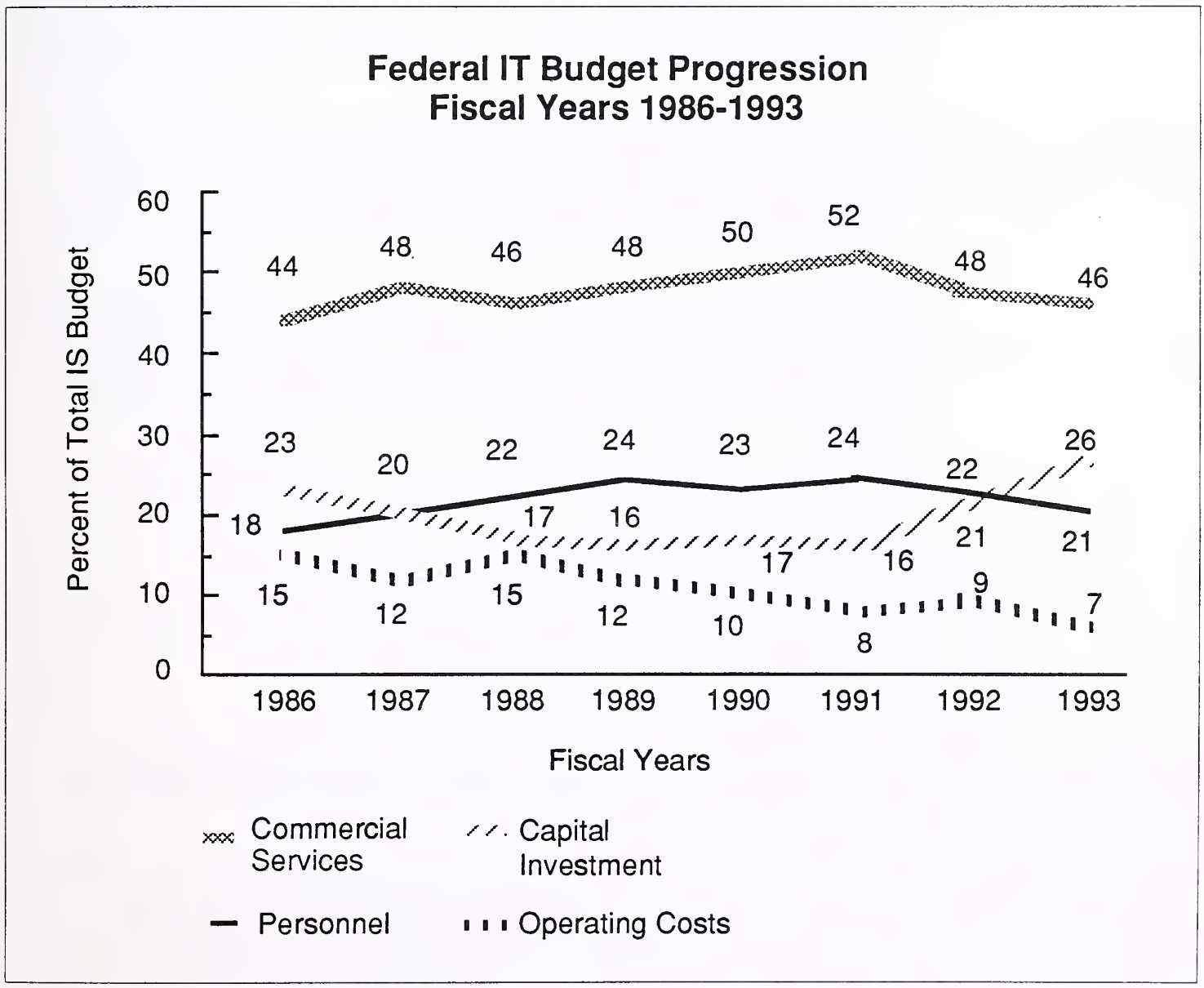
- Operating costs have decreased to 7%, only $180 million more than in FY 1992. About 25% of this amount goes toward leased equipment and software. Most is spent on facility leases, repairs and expendables.

- Personnel outlays are proposed at 21%, slightly lower than last year. The amount is actually $140 million higher than FY 1992, reflecting both pay increases for the federal staff plus travel expenses. None of these outlays are spent on contracts.

This budget representation concerns the proposed outlays or expenditures in FY 1993, not the budget request submitted to Congress. The latter is the additional funding needed after various transfers for services between the agencies and from other projects. As a result, some presentations have identified $24 billion as the 1992 budget authorization request.

The proportion of the budget spent in each of these segments has varied considerably in the past decade. In the period of FY 1986 to FY 1993, there have been progressive changes, as illustrated in Exhibit III-4.

EXHIBIT III-4



- Beginning in 1988, commercial services steadily increased about 2% per year to 52% in 1991, indicating a growing reliance on private-sector sources. Outlays fell in 1992 to only 48%, and in 1993 to 46% of the requested funding, reflecting the substantial increase in planned capital investment. Most prognoses indicate a return to 50%-52% of IT spending after 1995.

- At the other end of the budget spectrum, operating expenses have declined over the same period as the inventory of computer leases was terminated in response to Congressional mandates in 1987-1988. The slight increase seen in 1992 for the lease of software and hardware is declining to 7% in 1993.

- The decline in capital investment prior to 1992 paralleled the reduction in cost per MIP, accelerated PC acquisitions, and the cancellation or slippage of a number of projects over this timeframe. The significant jumps in FY 1992 and FY 1993 support release of more than one billion dollars by the CIM project office, increased spending by Treasury, and emergency upgrades needed by a number of older information systems.

- Federal personnel costs were at their lowest in 1987 when a number of older ADP suites were removed from service. Through 1991 agencies partially reversed the outward flow of qualified people. In 1992 and 1993, however, the proportion of the IT budget again declined, although the current dollars are higher, suggesting status quo conditions.

Exhibit III-5 lists the actual outlays for each of the four segments over the period of FY 1985 to FY 1991. Data on FY 1992 will not be available until April 1993. The outlays present a slightly different distribution than requested in the budget for the year. The changes are caused by a number of actions.

- Some proposed systems or hardware procurements were cancelled or reduced by Congress.

- Other expenditures increased in response to activities added by Congress in the Budget Authorization and/or the Appropriation Acts.

- Leases were converted to ownership or terminated.

A comparison of the IT budget requests with the actual outlays for the same timeframe indicates the relative closeness of the two in 1985, 1987 and 1989, as shown in Exhibit III-6

- In 1986, several systems were authorized by Congress to meet problems in Defense and NASA that had not been foreseen during the budget preparation cycle. Also, commercial services were increased to provide more communications and programming and analysis services.

EXHIBIT III-5

Actual Outlays of Federal Information Technology Budget—FYs 1985-1991

	$ Billions						
	1985	1986	1987	1988	1989	1990	1991
Capital Investments	2.8	3.1	3.5	3.3	3.4	4.2	5.3
Personnel	3.4	3.7	4.0	4.3	4.7	4.8	5.3
Operating Costs	1.7	1.8	1.9	1.7	1.6	1.8	1.6
Commercial Services	5.9	6.9	7.8	8.4	9.2	10.0	10.5
Total	13.8	15.5	17.2	17.7	18.9	20.8	22.7

- In 1988, Defense froze RDT&E expenditures in midfiscal year because earlier outlays were exceeding authorizations. By the third quarter, the Secretary of Defense authorized resumption of research programs, but denied expenditures for information technology.

EXHIBIT III-6

IT Budget Requests versus Outlays FYs 1985-1991

	$ Billions						
	1985	1986	1987	1988	1989	1990	1991
Request	13.9	14.3	17.1	18.9	18.4	19.5	21.4
Outlay	13.8	15.5	17.2	17.7	18.9	20.8	22.7
Variance	-0.1	+1.2	+0.1	-1.2	+0.5	+1.3	+1.3

FY 1990 and FY 1991 were affected by midyear increases in outlays authorized by Congress to meet Defense and civilian agencies' needs. The likelihood of outlays exceeding budget in 1992 is great, but 1993 will probably see expenditures limited to the amounts authorized at the beginning of the fiscal year.

3. OMB Five-Year Plans

The FY 1991 issue of the *Five-Year Plan* illustrated a growing reliance on the value of the plan by the Congress, demanding improved compliance of agency budgets with the terms of the Revised Paperwork Reduction Act. The annually updated plan progressively identified more of the proposed IT budget, as shown in Exhibit III-7.

The percentage of the budget represented by major programs increased over the nine-year period. Plan programs amounted to 27% of the FY 1983 IT budget and in FY 1991 reached 43% of the related budget.

It is evident in Exhibit III-7 that the value of an agency's major program funding in a given fiscal year has no fixed relationship with the requested IT budget. This dissimilarity is also noted in the federal processing services market.

- Although Defense IT budgets were half of the total each year, major ADP procurements for general-purpose resources were slightly less than one-fourth of the total funding for each year.

- The total value of major systems and services being acquired over the nine-year period is not revealed by the annual budget and OMB plan forecasts.

  - The total does not include funding for the early years of several very large systems integration programs.

  - The IT budget did not include expenditures for the FAA Advanced (ATC) Automation Program prior to 1991 because it was funded by the off-budget Airways Improvement Fund. Congress directed that these expenditures be given greater visibility by including them in the IT budget.

  - SDI supercomputers are special purpose to that program and included in project funds, rather than in the IT budget.

  - Beginning in 1992, Congress no longer requires independent agencies to file Section 43A&B if they do not expect to spend more one million dollars on information technology acquisitions.

EXHIBIT III-7

Federal Information Technology Budgets Comparison of Major Acquisition Plans to Total Information Technology Budgets, FYs 1983/1987/1991 ($ Millions)

Agency	FY 1983		FY 1987		FY 1991	
	IT Budget	OMB Plan	IT Budget	OMB Plan	IT Budget	OMB Plan
Defense	7,723	1,852	8,906	1,806	9,374	1,890
GSA	132	1,083	1,693	1,677	1,325	1,323
NASA	797	522	1,325	1,057	1,751	1,350
Justice	389	232	470	354	605	689
HHS	1,518	189	792	246	821	349
Agriculture	445	248	558	579	760	662
Treasury	518	729	1,247	899	1,332	1,044
Commerce	281	136	457	271	456	311
Energy	876	128	1,225	157	1,519	291
Interior	267	76	324	121	393	180
Education	68	76	65	54	84	53
VA	320	10	403	132	520	81
EPA	84	51	183	116	271	132
All Others	514	233	1,173	557	1,123	354
Total	13,932	5,565	18,821	8,026	20,334	8,709

Sources: Five Year Plan (OMB/GSA/NBS) 1983, 1987, 1991; OMB A-11 Section A3 - 1983, 1987, 1991.

- IT budgets and OMB plans also exclude planned expenditures of the public corporations, such as the Postal Service, TVA, BPA, etc., because they are considered off-budget expenditures.

- The 1992 version of the Five-Year Plan did not include listings of the major IT acquisitions planned by each agency. Instead, it provides profiles of significant long-range plans and outlines of some of the major projects needed to accomplish the missions.

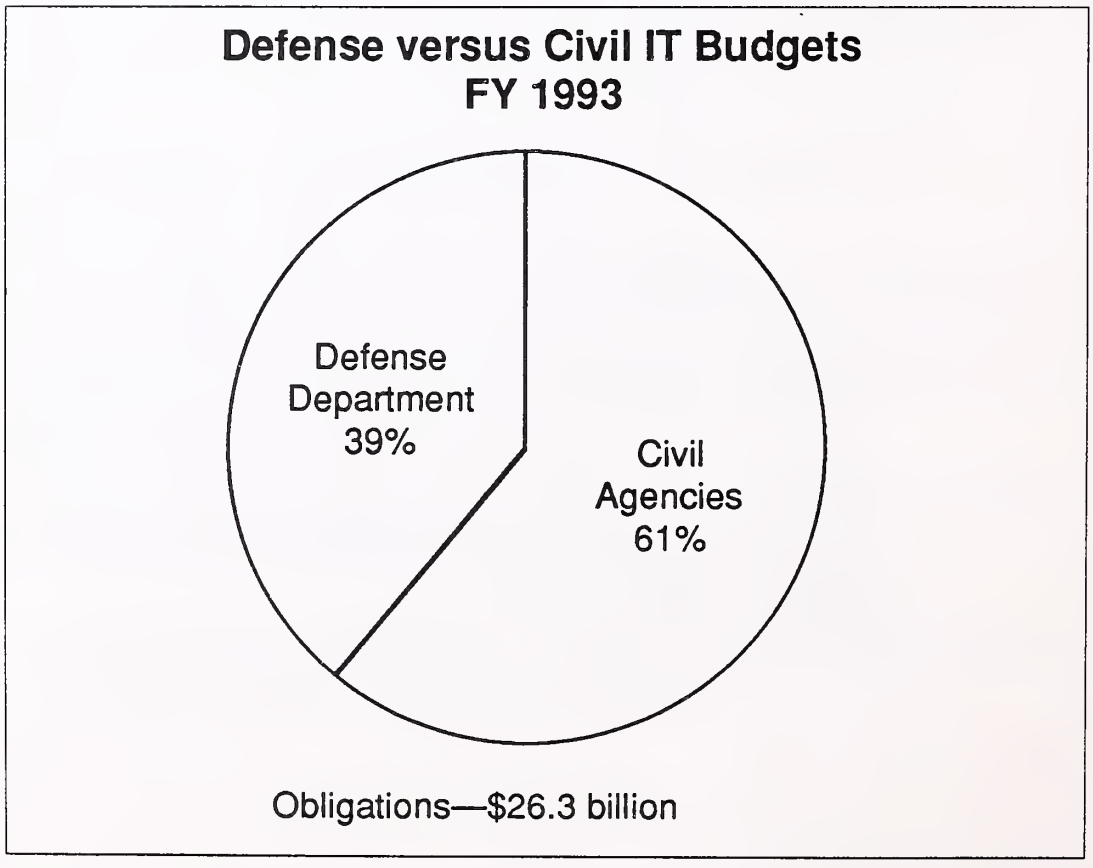
Exhibit III-7 also illustrates why INPUT's Federal Information Technology Procurement Program PARs and INPUT's Federal Systems and Services Market Program Market Reports are important to vendor clients. The *Five-Year Plan* does not cover many of the services recompetitions and critical low-level front-end studies for larger programs.

4. Defense versus Civilian IT Budgets

The proposed Defense IT budget for FY 1993 is about 40% of the whole budget, as shown in Exhibit III-8. It would have been even less if CIM had not released funding for several delayed systems, under pressure from Congress. The majority of the proposed outlays will acquire equipment and integrated systems, like SBIS and the changes authorized for the Joint Logistics Systems Center.

The net increase in the request for 1993 from 1992 is slightly more than 1%. The 5% increase in capital investment is offset by a nearly 2% decrease in commercial services (a much larger number).

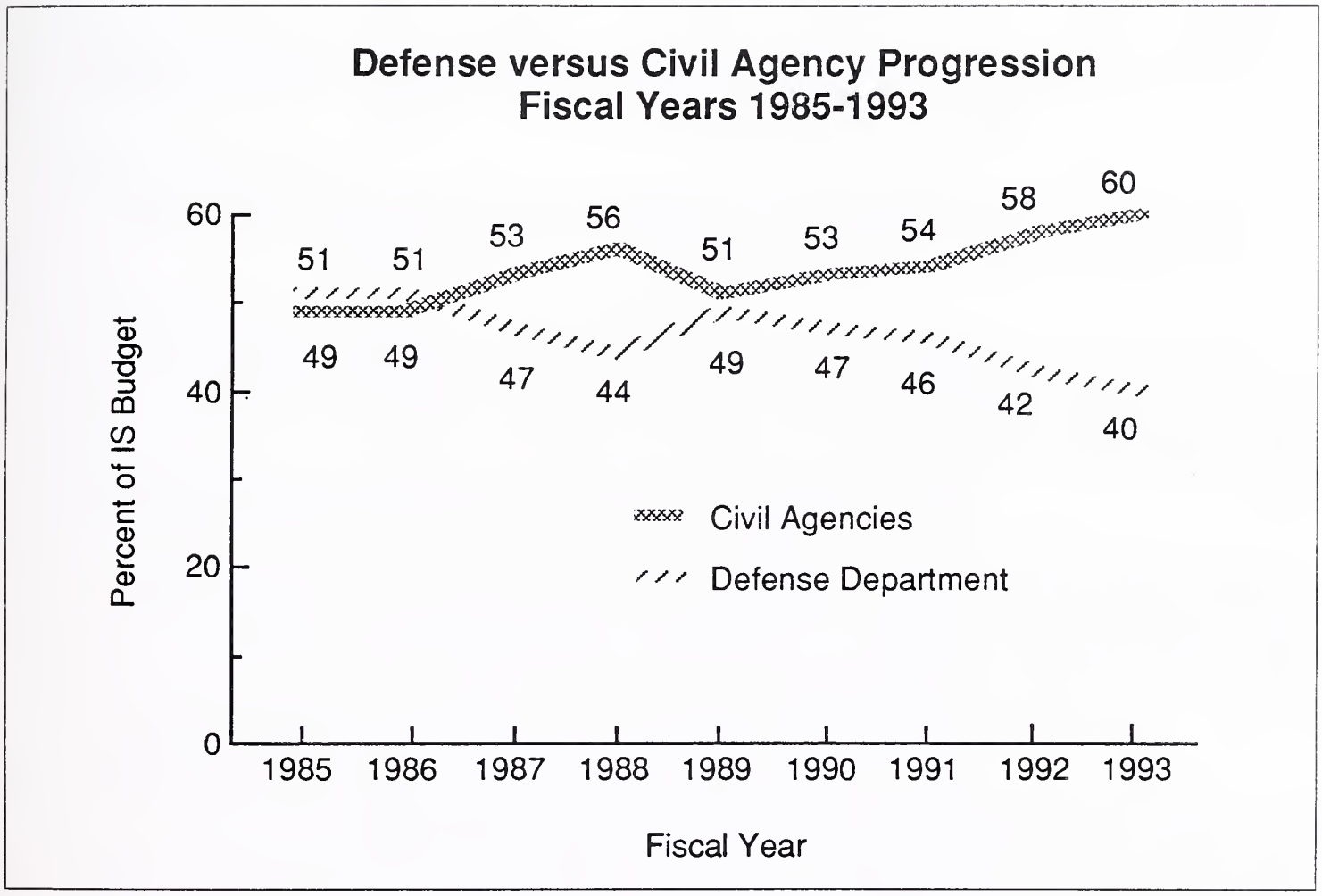
EXHIBIT III-8



The civil agency market continues to grow, increasing by 13% over the amount requested in 1992. The most significant increases appear in capital equipment and commercial services.

As far back as the post-Vietnam era, the Defense portion of the IT budget was noticeably less than that of the civil agencies. By 1983, DoD's share recovered, and gradually improved, so that by 1985 it was at 51% of the IT budget, as illustrated in Exhibit III-9.

EXHIBIT III-9



In 1987 and 1988, Congress reduced the Defense budget requests because the changes were poorly justified, and GAO submitted several reports indicating failure to take corrective actions on several programs with MAISRC-identified defects.

In 1989, the delays in funding approval had several important programs in serious trouble, and Congress was convinced to allow the budget to increase to 49% of the overall.

The following two years saw additional problems with WWMCCS modernization and the disagreements on how CALS would be run. Then came CIM, and Congress moved most of the new systems money under CIM control through the 1992 Armed Services Appropriations Act.

Through 1997, INPUT does not see the overall growth of Defense significantly improving—others see a real decline. INPUT forecasts the Defense IT CAGR as slightly more than 4%. The civilian agencies are expected to experience a CAGR of 9% over the same period.

5. Embedded Computers

Embedded computer systems are not included in the *Five-Year Plan* or the annual IT budget. Therefore, no in-depth analysis of that market can be provided in this report.

- The earlier projected average annual growth through 1990 of the number of embedded computers in the DoD was 11% per year, prior to the Defense budget cuts of 1986 to 1988 and since 1990.

- The growth in the number of embedded computers supports increased professional services in operations and maintenance contracts. In addition, significant hardware maintenance functions are being employed.

  - However, outlays are declining dramatically—particularly for custom software development and services—in the 1992-1997 timeframe.

  - If newer systems are not acquired, increased demands for updating software and key equipment modifications can be expected.

  - GAO reported to Congress that 1992 expenditures for software for embedded and classified systems was running $24-$32 billion, or nearly 8% of the entire military budget. Further, GAO expects total costs to increase to $50 billion per year within the next five years, unless some tighter controls are installed. DoD has in place procedures to monitor these costs, and promised Congress that costs would be controlled.

6. Classified Systems

The unrestricted nature of INPUT's service does not permit any significant identification and analysis of IT outlays for classified national defense and intelligence programs. Some agencies such as DIA and DNA acquire hardware and systems software in the unclassified market, but this is an exception rather than the rule.

B

Application and Technology Trends at Federal Agencies

1. Applications by Equipment Size

The federal government sector's trends for applications by equipment size are shown in Exhibit III-10. This exhibit was compiled from responses to INPUT's 1991 survey on computer system applications by equipment size.

The civilian agencies sampled most often assigned their large-scale information systems for information analysis, research and mission support applications. However, these same civilian agencies target management systems, human resources, accounting and word processing most frequently for midsized operations.

Large systems are still emphasizing applications of a centralized nature. High-performance computers, both vector and massively parallel machines assigned to research tasks, are being connected through high-performance communications networks.

Midrange computers or minicomputers now play a vital role in the increasingly decentralized and networked environments in governmental user organizations. The federal user community is demanding powerful shared resources that can handle a myriad of department and data center functions.

Information analysis, scientific and engineering support, logistics and mission support are the most frequent application areas for the Defense agencies. For midsize systems, logistics, word processing, graphics and electronic mail comprise the largest categories of application areas. Specific technical applications, such as those identified as scientific, make up a smaller portion of applications run on DoD minicomputers.

Federal agencies plan major upgrades of systems for human resources, management, graphics, and logistics and distribution applications. Part of this thrust reflects an increasing awareness by agency executives of the users of their information. This awareness is particularly evident in the area of logistics. A significant portion of system upgrades by the Defense agencies focuses on upgrading existing systems with the CALS initiative, rather than acquiring new systems.

Replacement of systems is most noted in office automation, information analysis and scientific/engineering applications. Rapidly changing hardware technology continues to quickly render these systems obsolete.

EXHIBIT III-10

Federal Applications by Equipment Size

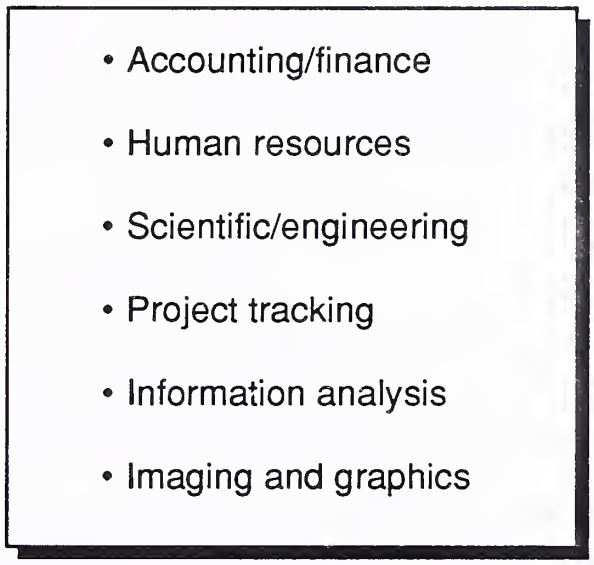
Application Type	Percent of Respondents Mentioning by System Size				
	Micro-computer	Work-station	Mid-sized	Main-frame	Super-computer
Information Analysis	71	50	56	81	17
Human Resources	74	31	46	75	0
Electronic Mail	75	61	69	56	17
Electronic Publishing	89	67	33	46	0
Logistics and Distribution	74	40	39	93	0
Scientific/Engineering	77	86	75	83	80
Communications	61	65	73	93	50
Word Processing	92	72	38	38	17
Administrative	74	35	67	80	0
Finance/Accounting	71	33	64	85	0
Project Management	87	53	40	40	0

Some agencies plan new starts in the traditional areas of information analysis and administration. In general, these programs represent efforts to bring computer-based productivity improvements to the functional operations of the agency.

Fifty-two percent of respondent agencies are in the process of downsizing or have already downsized applications to smaller computer systems. According to agencies surveyed, the most popularly downsized application is accounting/finance. Exhibit III-11 lists applications identified by respondents as being downsized.

EXHIBIT III-11

Applications Being Downsized



Respondent agencies are downsizing to the following systems:

- Twenty-eight percent of the respondents are downsizing to microcomputer systems.
- Eight percent are downsizing to workstations and 16% are downsizing to both.
- Forty-eight percent of the respondents are not planning to downsize in the foreseeable future (subject to change).

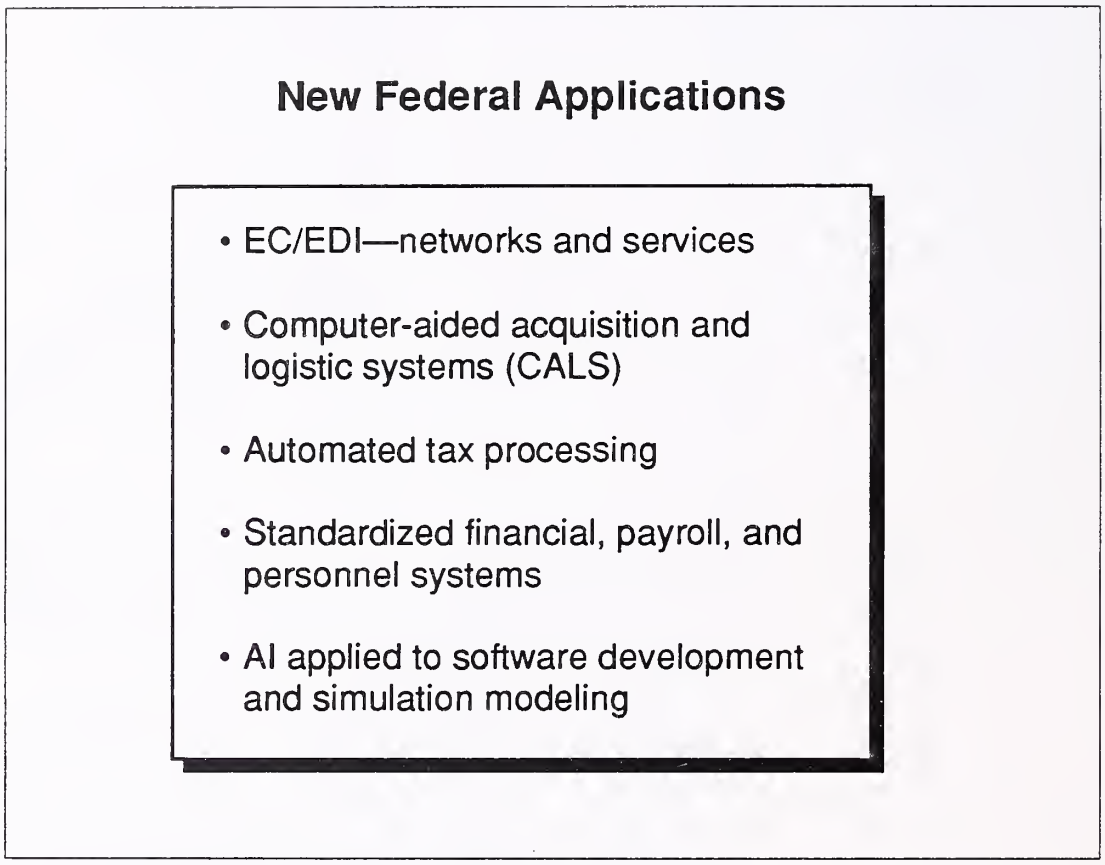
Of the respondents that are downsizing, many are moving accounting and finance applications to microcomputer systems. This trend may be a signal to software producers and hardware vendors for increased emphasis on microcomputer accounting and financial software.

Some applications obviously cannot be moved off a mainframe. Applications such as order processing, worldwide networking, big number crunching, relational data base programs and heavy-duty account processing require a high level of computing power and speed that smaller computer systems cannot provide.

2. New Applications

The sheer volume of transactions and complexity of operations within the federal government sector requires a constantly changing focus as managers with an existing set of applications seek to apply new developments to a wide range of information service problems. New applications are shown in Exhibit III-12.

EXHIBIT III-12



Electronic commerce (EC) represents a key emerging application. It accelerates the accurate interchange of procurement (EDI), logistics (CALS), financial (EFT), benefits (EBT), drawings (EDT), filing (EF) and other data, while improving the accuracy of these transactions. Because EC/EDI uses conventional data processing and telecommunications capabilities, the emphasis in the federal sector will be development of vendor-furnished networks, software and services to facilitate EC/EDI implementation.

Currently, federal EC/EDI lags behind the explosive growth in the commercial applications. With the exception of a few major programs, most EC/EDI initiatives tend to be small pilot systems in which both government and vendors can assess costs. The awards for EDGAR at SEC and GSA's invoicing system may change that.

The CALS (Computer-Aided Logistics Support) Initiative of the Defense Department and NASA is an application of automation to logistics to accomplish several goals:

- Integrate data life cycle elements in a source-to-use network
- Ensure compatibility of data interchange between logistic systems
- Automate the acquisition elements of:
  - Stock order processing
  - Shipping document generation and handling
  - Inventory analysis
  - Technical order (repair) systems
  - Technical manual and documentation generation on a demand basis

Each major DoD agency is proceeding with CALS-related initiatives. However, some vendors have expressed continuing concern over data security and the lack of comprehensive standards. The DoD CALS policy office, in conjunction with the National Institute of Standards and Technology (formerly the National Bureau of Standards), is developing the necessary standards. However, considerably more must be done before the data security issues are resolved.

Automated tax processing applications (EF) are developing on several fronts:

- Internal automation at the IRS Regional Centers, providing enhanced capabilities for:
  - Rapid conversion of tax forms to electronic form
  - On-line retention of several years' returns
  - Automated analyses to select returns that need detailed auditing (rather than sampling methods)
  - Automated preparation of refund payments
- External automation of the tax return process, allowing:
  - Electronic filing (EF) of individual returns
  - Electronic filing (EF) of small business returns, which involve more forms
  - Electronic fund transfers (EFT) for tax payment and refunds

After a succession of GAO (General Accounting Office) audits identified increasing incompatibility and decreasing accuracy of financial, payroll and personnel systems, OMB has directed conversion or replacement of these systems by all agencies.

- Financial systems were supposed to meet a single set of standards and produce compatible products by FY 1992. (The Joint Financial Management Improvement Program is playing a major role.) Slippage in 1990 and 1991 caused by funding shortages made the target date unreachable.

- Payroll systems must meet new accuracy and timeliness standards and be compatible within military and civilian agencies by the mid-1990s.

- Personnel systems must be upgraded to meet all of the EEO and privacy protection criteria by the early 1990s.

Artificial intelligence/expert systems applications are moving to near-term implementation and availability in several areas.

- The Department of Defense has several pilot projects and initial programs underway in which AI provides assistance to human control functions.

- AI is also being employed to develop models for a number of applications, including the automated tax audit system, gaming for military training simulators and automated logistics processes.

- AI is being tested for use in development of applications software to include automated documentation generation and selection of alternatives that minimize future maintenance problems.

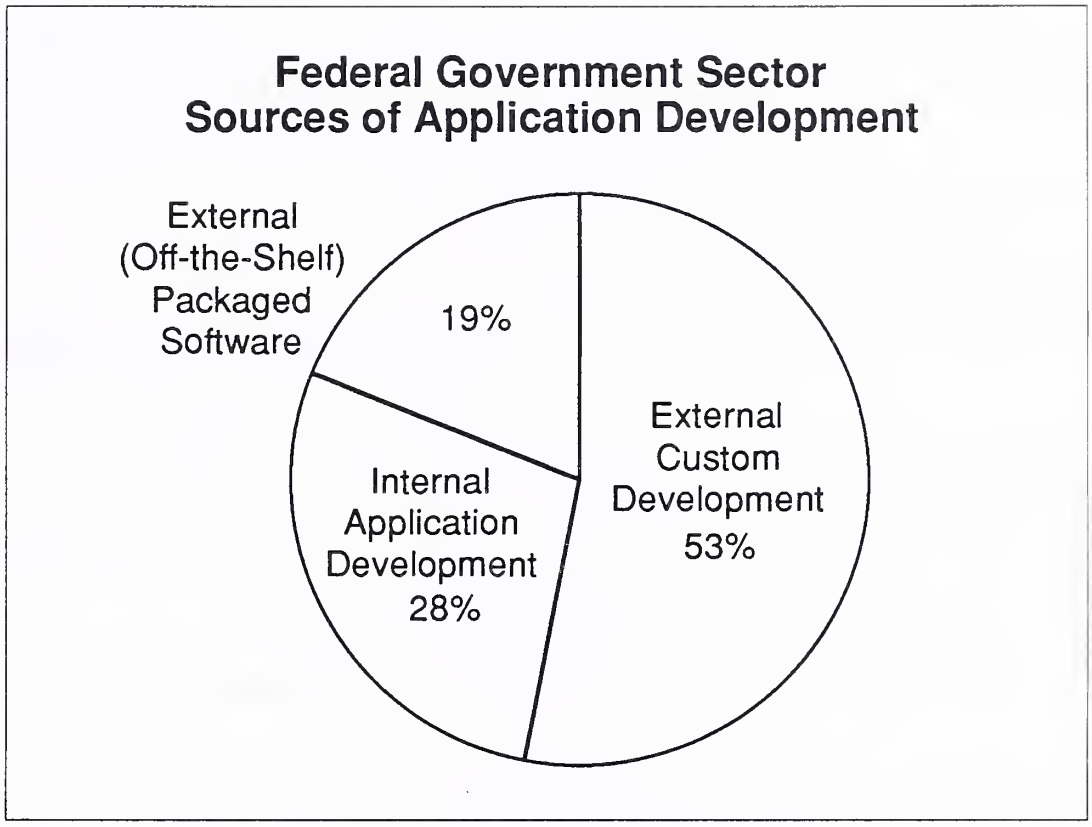
- Decision support systems, in a variety of administrative and scientific environments, continue to be the primary use of AI in the government.

3. Software Sources

a. Development Sources

The federal government continues to be heavily dependent on custom development of new applications, partly based on a perceived need for government-unique solutions and partly based on continuing dependence on a large inventory of early third-generation processors. This dependence on outside development sources is illustrated in Exhibit III-13.

EXHIBIT III-13



Externally developed, off-the-shelf software package use is driven by the rapid growth of end-user personal computer use. Packaged software is available for minicomputers, of which the government has a large inventory. The share of application development by this sector is expected to continue to grow.

Demands on the internal (in-house) IS staff to maintain older but critical custom software prevents them from assuming a greater role in developing new systems. GAO and NIST surveys have demonstrated that more than 70% of the software life cycle costs are expended on maintenance and undermanaged enhancements.

For now and the foreseeable future, the predominant source of major new application development will be external to the government. The majority of development will come from professional services and software development firms.

A smaller but very significant part of development will come from universities and not-for-profit organizations, especially in AI, supercomputers and automation applications. Ada use will also grow sharply over the next few years, unless delayed by agency requests for waivers based on cost and training.

b. Impact of Technology

Agency and industry representatives were asked to identify technological factors that would alter the federal government's spending for information services and applications development at agencies. The factors named most frequently are listed in Exhibit III-14.

EXHIBIT III-14

Technological Trends Affecting Federal Government Sector

Trend/Factor	Rank*
Expanded networks/LANs	1
Advancements in operating systems	2
Increased microcomputer capabilities	3
Improved imaging/graphics	4
Developments in artificial intelligence	5
Advancements in communications	6

*Rank based on frequency of mention by respondents

The federal government is expanding its computer networks and use of local-area networks (LANs). The agency applications directed to LANs included administration, project management, agency data bases and finance. Over the next few years, mission support and personnel functions will also migrate to LANs in order to distribute information among various user groups.

Advances in operating systems will support the interoperability needs of most agencies and thus rank high. Increased computing power of microcomputers is also rated as an important factor affecting future system requirements. Increased capabilities would hasten the downsizing of applications to microcomputers over the next five years.

New technologies for graphics and improved imaging offer enhanced capabilities to agencies to support their information collection and analysis requirements. Advancements in these technologies will improve productivity at government agencies.

Artificial intelligence—or more specifically, expert systems—has already been employed in limited applications. New approaches that use AI include software development, process monitoring and simulation. AI is also gaining in use in tactical situations, automated planning and support applications throughout DoD.

Presently, however, decision-support systems represent the most common federal applications for AI. Some examples include photographic analysis for NASA, tax auditing for IRS, and eligibility verification for Social Security.

Furthermore, replacement programs of the late 1980s moved into both higher capacity mainframes and distributed systems that are minicomputer-based.

In the federal market, system upgrades and expansions involve replacement or addition of specific ADP elements. The most recent *Five-Year Information Technology Plan* indicated a significant investment for increasing memory systems and data communication hardware. New leases are planned for newer technology mainframes and operating software when capital investment funds are not available.

For the 1990s, a number of expansion projects involve the addition or extension of networks. Some projects require networks to serve workstations. Still others will connect micros and minicomputers, which in turn are, or will be, tied to centralized data bases. Software for these projects is either acquired separately through professional services vendors or developed in-house.

Traditionally, federal agencies have used supercomputers for highly scientific and technical applications. NASA and the Department of Energy own the bulk of these systems, but major DoD agencies also have supercomputers installed in both classified and unclassified establishments.

Passage of the High-Performance Computing and Communications Act is a catalyst for joint agency-academic-industry participation. Projects are aimed at employing these capabilities in a number of identified critical national issues. The bulk of the effort and responsibilities lie with six key agencies in a five-year funded effort.

INPUT's PAR data base currently contains 20 programs involving supercomputers, and a separate report was written in 1992 highlighting the agencies and the issues.

NASA has developed a controversial policy for supercomputer procurements. It is allowing vendors of Japanese equipment to bid on production-oriented systems, such as the Engineering Analysis and Data System (EADS II) at Marshall.

However, NASA is precluding foreign participation for research-oriented systems, such as Ames' High-Speed Processor III initiative. INPUT expects Administration trade policy, rather than procurement policy, to resolve this controversy.

Newer systems are being acquired with matching operating systems in a number of projects. This approach works with upwardly compatible applications software. In small system improvements, some applications software is acquired in packaged form.

C

Major Issues and Driving Forces

1. Major Issues

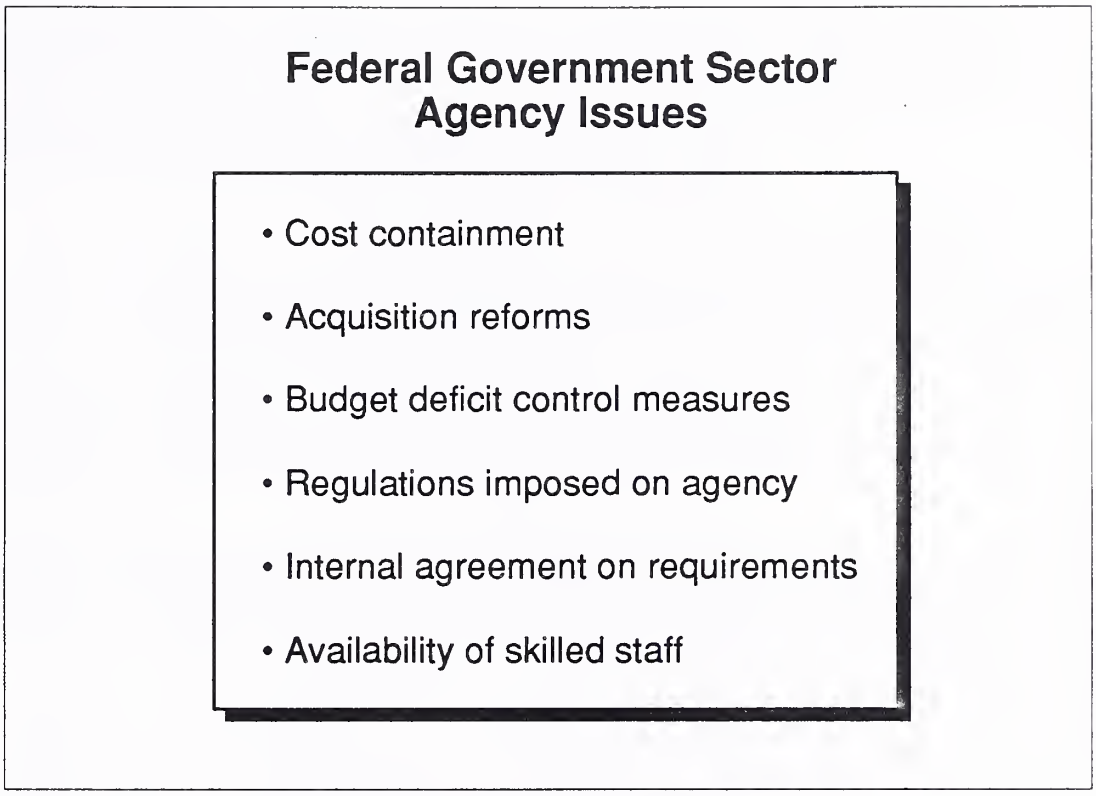
The federal agencies face several major issues as they move forward to modernize and expand their information systems. These issues are shown in Exhibit III-15

Cost containment will be a key issue to government agencies responding to the combined pressures of Congress and the continuing slowdown in R&D expenditures. Defense, in particular, is experiencing significant budget cuts. Many small vendors with federal contracts expect reductions in profits. To keep costs within the government's control, competitors are now required or encouraged to submit fixed-price bids on most systems integration and IS upgrade projects.

Several new acquisition, management and usage procedures have been incorporated into the *Federal Information Resource Management Regulations* (FIRMR) and others are still pending. The reforms are intended to streamline the purchasing process while improving the amount of competition. The improvement initiatives include:

- "GO FOR 12," a joint agency program to reduce the acquisition process to 12 months

EXHIBIT III-15



- "TRAIL BOSS," a GSA program for increasing the acquisition authority of selected government program managers and procurement officials. TRAIL BOSS II and TRAIL BOSS III were offered in 1992.

- "FAR (Federal Acquisition Regulations) Streamline," a new initiative to further reduce the volume of the regulations and employ conventional business terminology

With recent changes in management at GSA, there will likely be further changes in IRM policies and procedures.

Budget deficit control, whether provided under the terms of the Gramm-Rudman-Hollings Act or direct Congressional action, is expected to affect the rate and/or extent of IS modernization at the agencies. Continuing economic and political sensitivity to the rising budget deficit could negatively impact a number of acquisitions in the less-than-critical defense and civil technology sectors.

Even some programs widely considered critical are taking minor cuts. Major ADP systems already approved, especially those on the Presidential Priority lists, are likely to continue in preference to new and unapproved programs.

The complex and lengthy regulations imposed on the agencies are viewed by many as a severe impediment to systems acquisitions and software development. Combined with a lack of internal concurrence and management interest in extending information automation, these two issues are of concern to the agencies as they plan systems acquisitions and utilization of new information technology.

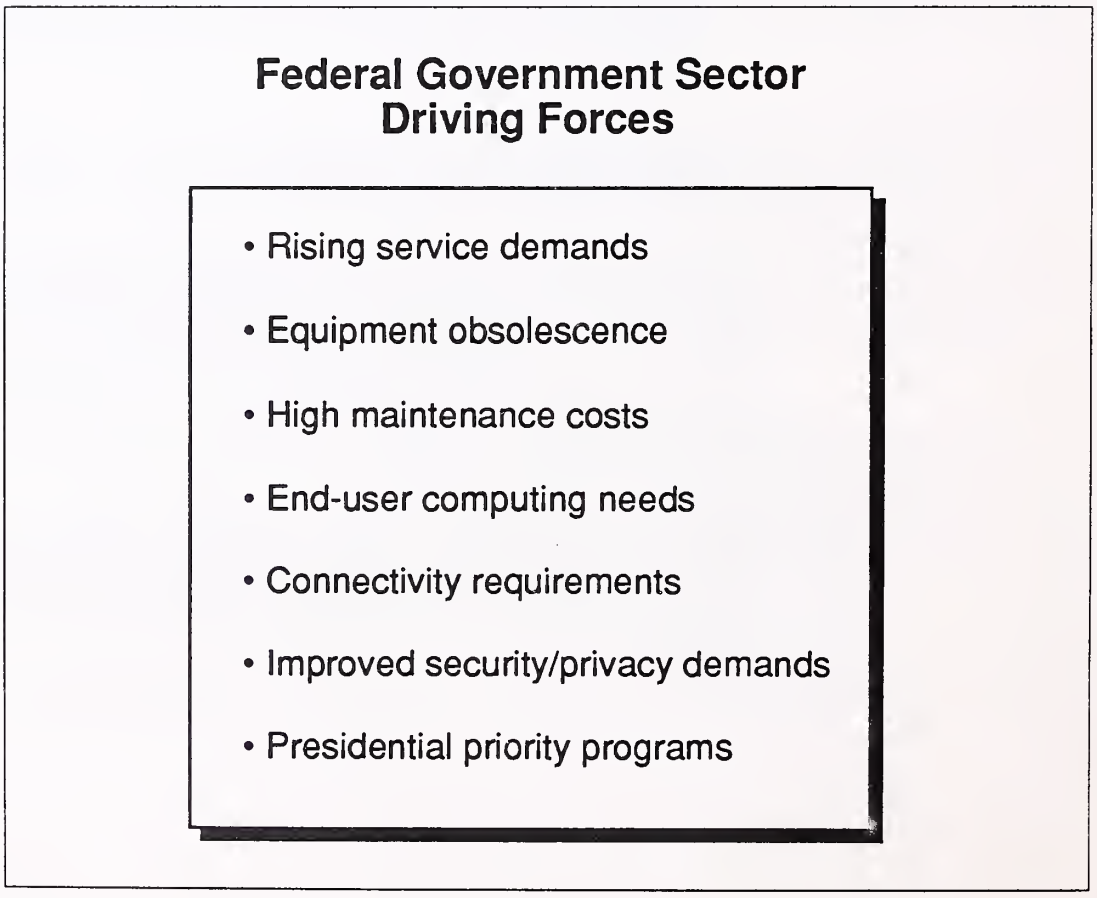
Furthermore, the federal government does not currently have the requisite level of in-house staff to support the quality or quantity of ADP-supported services mandated by Congress and expected by the American people. The agencies' personnel policies contain outdated standards and job descriptions and impose severe administrative problems.

Some resolutions to these problems are being developed. Currently, agencies are working with the Office of Personnel Management to upgrade procurement professionals and give greater support to contracting personnel.

2. Driving Forces

The driving forces behind the federal market for information systems are summarized in Exhibit III-16. The federal government was the first wide-based employer of large data processing capabilities. Despite an inventory in excess of 15,000 systems, not counting microcomputers, current IS resources are experiencing difficulty in meeting rising service demands.

EXHIBIT III-16



Though not as pronounced as in the early 1980s, the ADP equipment (ADPE) inventory still includes a significant number of third-generation machines that lack the flexibility, speed, reliability and capacity of currently available technologies.

The combination of older ADPE and a very large inventory of custom software has driven maintenance costs up and extended repair times. GAO and NIST have estimated that about 70% of software life cycle costs go to maintenance and enhancement, and tie down an inordinate percentage of in-house IS staff. The Defense CIM initiative has as one of its goals the inversion of this cost picture, to reduce maintenance costs to 30% of life cycle costs and free the staff for more productive software applications.

The need to share data under the constraints of the amended Paperwork Reduction Act and to interact to meet Administration requirements (including the Reform '88 and successor initiatives, CALS, and SDI initiatives) will require substantially improved connectivity. New federal standards exist for uniform protocols, open system architectures and standard systems interconnections. However, some resistance continues, especially to GOSIP, as some agencies seek to retain their TCP/IP systems.

Administrative and Congressional demands for improved security measures raise national security and individual privacy protection issues. Congress is also considering new computer theft and proprietary data protection measures that will affect commercial and individual privacy as well as national security. However, the consensus of agency respondents is that something drastic will need to happen before IS security is properly funded.

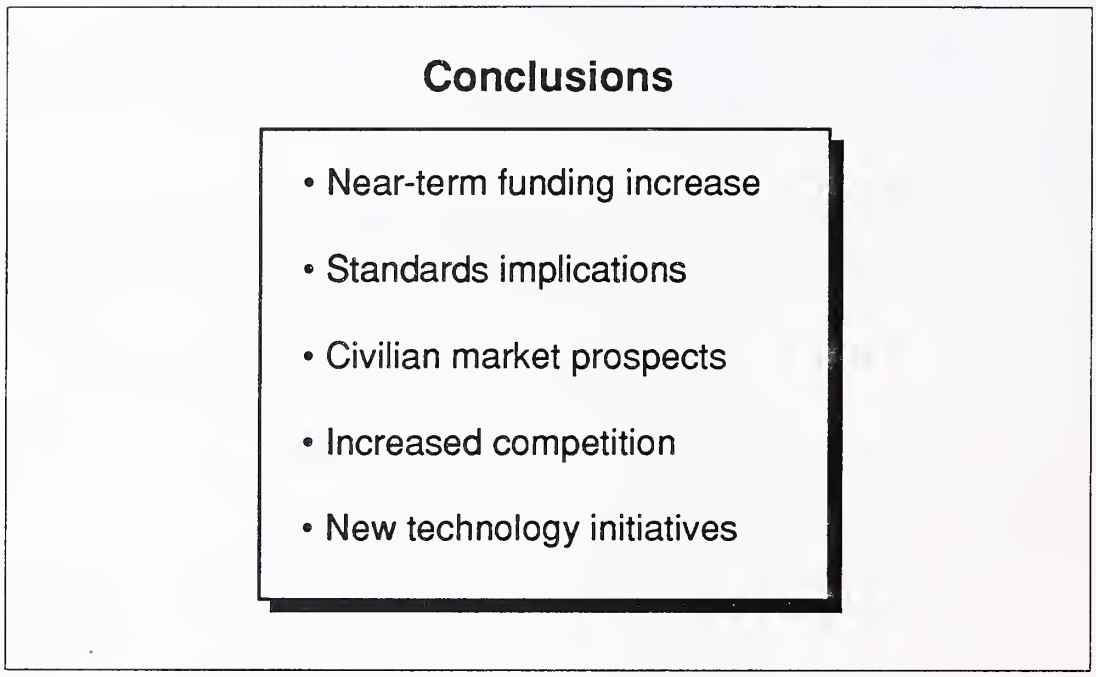
The large number of candidate new and replacement information systems in the procurement process required a priority process to assure completion of those associated with key Administrative initiatives. In keeping with the practice of the last few Presidential fiscal-year submissions, the FY 1993 budget of the United States government indicates areas of high risk and the Program for Priority Systems (PPS), selected for their size, complexity and sensitivity. These ongoing and new systems are considered most likely to be funded, even if some others need to be delayed, or, if needed, terminated.

D

Conclusions

Industry and agencies recognize that a number of factors are slowing the explosive growth in information technology that characterized the 1980s. At the sane time, there are factors that can influence the market for continued activity in the middle of the decade of the 1990s, as listed in Exhibit III-17.

EXHIBIT III-17



1. Near-Term Funding

The pressing need for expansion of some systems, downsizing of many others and the addition of several new ones, especially those under control of Defense's CIM initiative, results in higher than anticipated outlays in FYs 1992-1994. Beyond 1995, there is no indication that rates of spending will not fall back to those experienced 1990 or even in 1985.

IT will still be given a fairly good share of the federal budget to help agencies meet the growing demands for more flexible and responsive government services.

The large cuts in the Defense budget are expected to impact weapons, platforms and facilities, and, ultimately, military personnel staff strengths by as much as 20% of regular forces and 20% of reserve forces. The related reduction in MIL-SPEC IT equipment acquisition may be partially offset by wider use of commercial-grade equipment.

2. Standards Implications

After more than a decade of indecision about the need for a range of standards, all of the government is moving to enforcement. These standards will offer interplatform compatibility and applications that are platform-independent and substantially improved for data interchange.

Some vendors not geared to provide supplies that meet FIPS-PUBS and NIST security standards will lose market share. Platform acceptance may be tied to qualified software, such as the GSA/JFMIP financial systems schedules. Defense contractors are likely to be impacted by changes resulting from several DMR directives from CIM aimed at both simplification and compatibility between the military departments and Defense agencies.

3. Civilian Agency Market Prospects

The downward shift in Defense IT outlays while the overall IT market is still experiencing growth emphasizes the significant jump in civilian agency initiatives. Some of these, like the SSA's System Modernization Program, and the FAA's Advanced Automation System (for Air Traffic Control) are well underway, but by no means at an end; more contracts will be awarded in this decade. Others, like the Tax Modernization Program, have barely embarked on investments that can easily be in the billions in the next ten years.

At the same time, several of the initiatives described in the CIM documentation, such as those listed in DMRD918, will still represent opportunities in the near term, as DISA and DITSO embark on a new round of downsizing, centralizing and standardizing. In the long run, the public may be better served, but industry's role is not clear or confirmed.

4. Increased Competition

The competition in the federal market will continue to evolve as the growth rates and number of significant opportunities decline.

Aerospace firms that first looked to IT in Defense are now examining the civilian agencies for replacement markets.

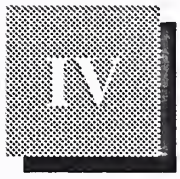
The large hardware and professional services firms with a strong market position are digging in and slimming down to capture new and recompetitive business.

Smaller firms and niche market firms are either forming alliances or moving into the equally depressed commercial market. Competition in this market has become more sophisticated and fierce.

5. New Technology Initiatives

The federal government has not entirely walked away from support of new information technology offerings. Instead of underwriting development, agencies are now expecting industry to offer demonstrated improvements, COTS/NDI, that will provide enhancements to quality, flexibility and productivity of processing capabilities that support agency missions.

Improvements in artificial intelligence, data base systems, imaging systems, reusable and modular software, high-performance computing and communications, and software productivity tools (like CASE) are being sought that can be accommodated as technology insertions to existing facilities. Agencies, particularly Defense, want software that is hardware independent and permits the rapid interchange of data.



Market Forecast

INPUT dissociates the federal IT budget elements and recombines them into more convenient industry terms. The first reassembling provides an overall perspective of that portion of the budget spent on contracts for goods and services. In the remainder of this section, INPUT provides forecasts and discusses trends of the individual delivery modes that are defined in Appendix B.

A
Overall Federal IT Market

The overall market planned for federal acquisition of IT was expected to reach $17.8 billion in fiscal year 1992. INPUT believes that the market will increase at a compound annual growth rate (CAGR) of 6%, to reach $24.3 billion in FY 1997, as shown in Exhibit IV-1.

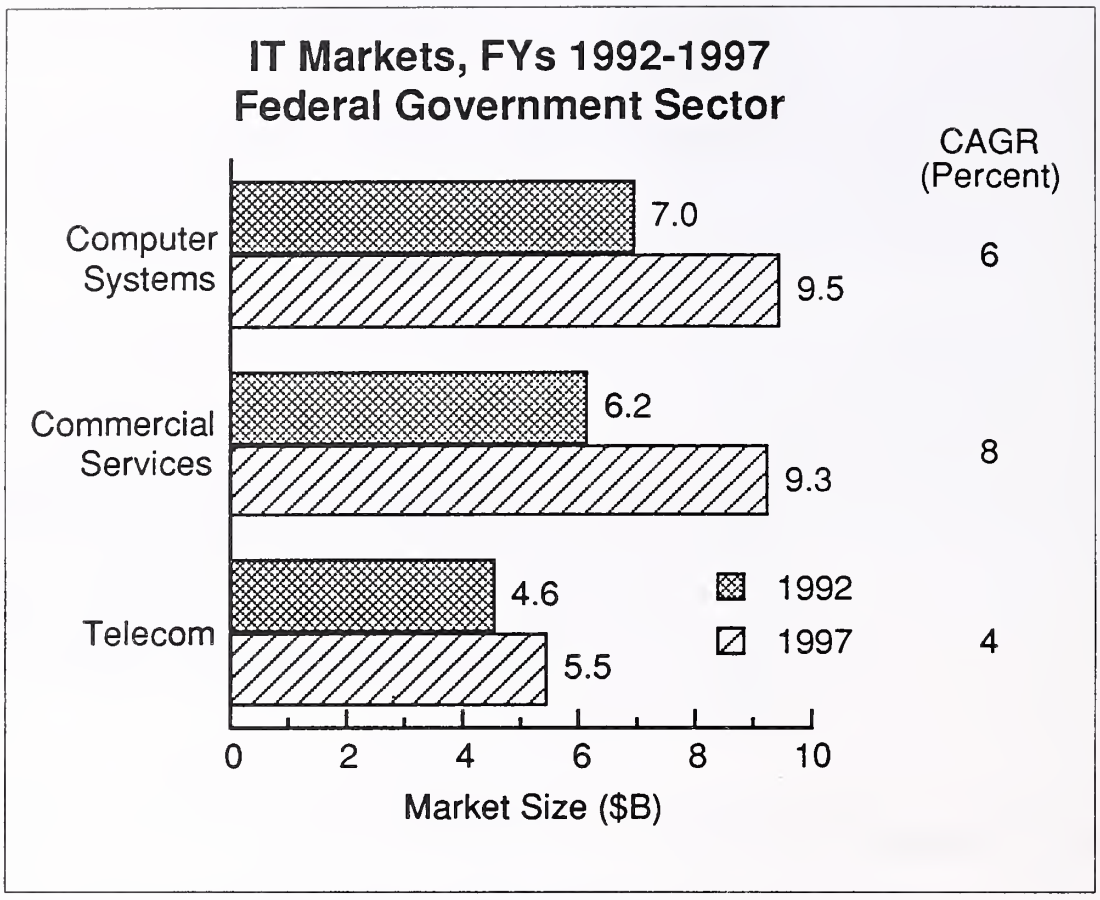
This growth rate is three percent less than forecast in 1991. The decrease is based on current economic indicators, including forecasted GDP, federal budget requests, CBO projections and inflation factors discussed in the Introduction.

Several economic and political factors discussed earlier can further reduce the IT growth rate moderately to significantly. At present, INPUT is unable to discern a clear pattern, but sees that IT outlays have remained high during recent years, despite the rising deficit.

The second largest component of this market is expected to be commercial services. The FY 1992 spending level of $6.2 billion is expected to grow at an 8% CAGR to $9.3 billion in FY 1997. This segment includes professional services, processing services, systems operations, and maintenance.

The current agency long-range plans indicate a continuing need for industry operational support, despite program cancellations and prospects of consolidation of computing resources. Last year, the predicted CAGR was 10%, down from the 12% CAGR of FY 1989.

EXHIBIT IV-1



Computer systems, which is the largest component, includes systems integration, turnkey systems, and major equipment addition and replacement. For some time, computer systems was a gradually declining market, down to a CAGR of 5% in 1989.

Prospects now look better, with the FY 1992 outlay of $7.0 billion increasing to $9.5 billion in FY 1997 at a CAGR of 6%. Agencies still expect to acquire more mainframes and more-powerful desktop workstations during this period, with major expenditures in FYs 1993-1995.

The communications segment includes circuit/time charges under FTS-2000, network services and customer-premises equipment. The rate of growth declined in FY 1992 from FY 1991 when it was forecasted at 10%.

INPUT now expects these services to increase from $4.6 billion in FY 1992 to $5.5 billion in FY 1997 at a CAGR of 4%. The forecast includes a number of dedicated data networks, more LANs and increasing digitization, but at decreasing tariffs.

The expenditures shown here are based on those requested by the agencies in their 43A&B budgets. Congress keeps suggesting that the value of FTS-2000 alone is at least one order of magnitude greater. It is not clear whether the agencies use operations funds instead of IT money, or someone in Congress is exaggerating for political impact.

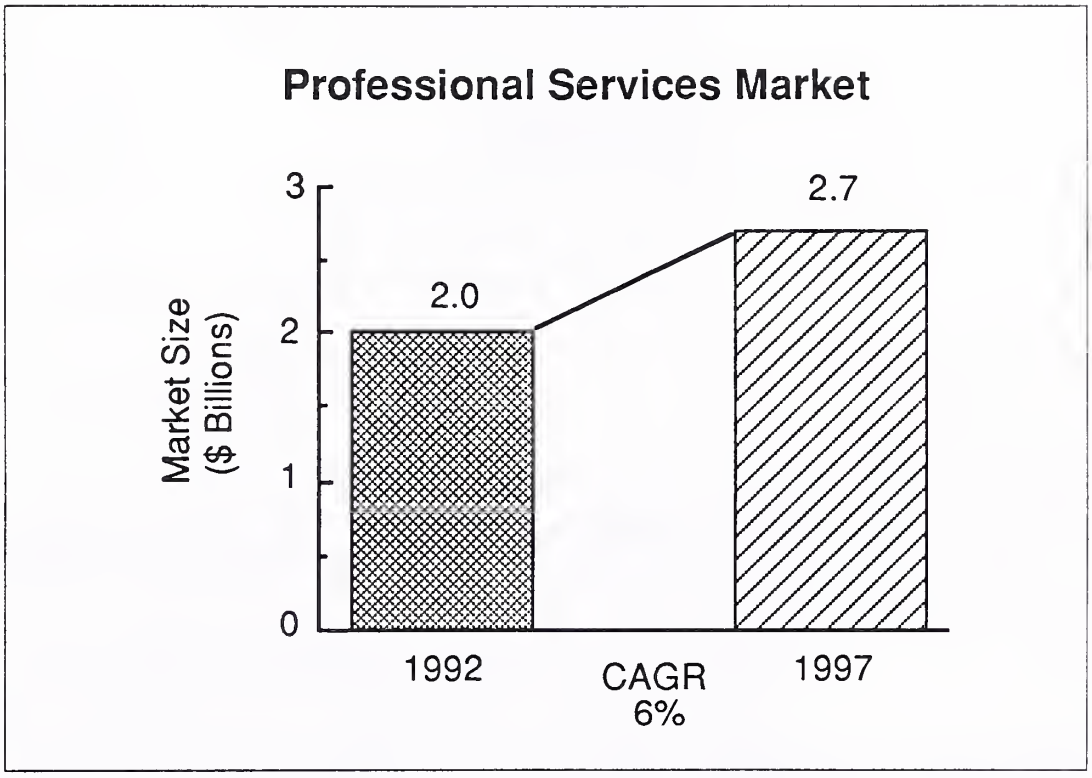
B

Professional Services

Professional services includes consulting, design, education and training, and software development. This segment does not include the professional services associated with systems integration, systems operations, and telecommunications.

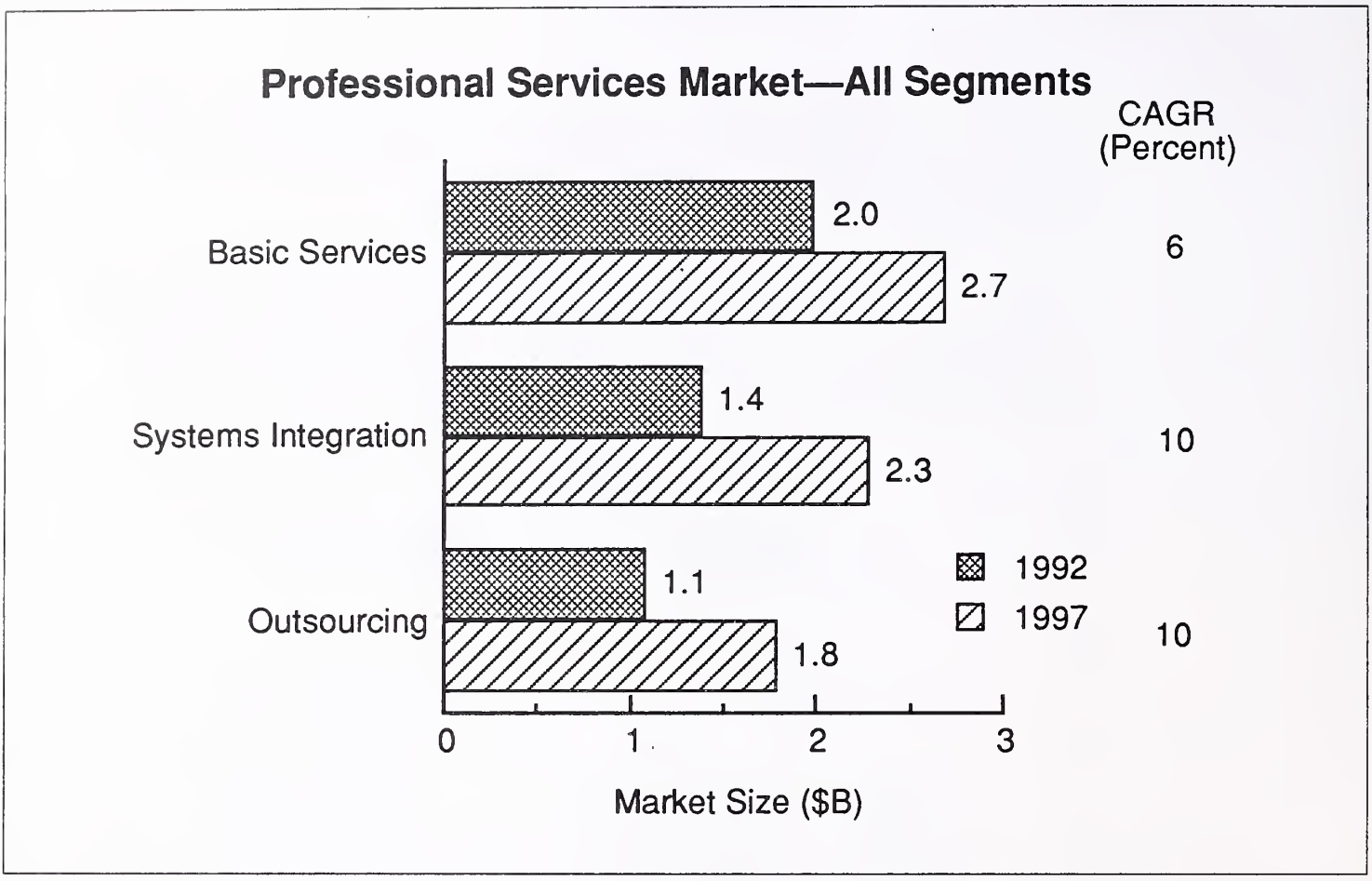
The federal professional services market is projected to increase from $2.0 billion in FY 1992 to $2.7 billion in FY 1997, as indicated in Exhibit IV-2. The projected CAGR of 6% is slightly less than the 7% CAGR of 1991 and 1990, less than the 8% of 1989, and a significant drop from the 13% forecasted in 1988.

EXHIBIT IV-2



The projected need for contractor assistance makes the federal government the largest user group for professional services in the U.S. If all of the segments excluded from the basic professional services mode, in systems integration and outsourcing, were added, the entire market would grow from $4.5 billion in FY 1992 to $6.8 billion in FY 1997 at a CAGR of 9%. The relationship between the distributed modes is illustrated in Exhibit IV-3.

EXHIBIT IV-3



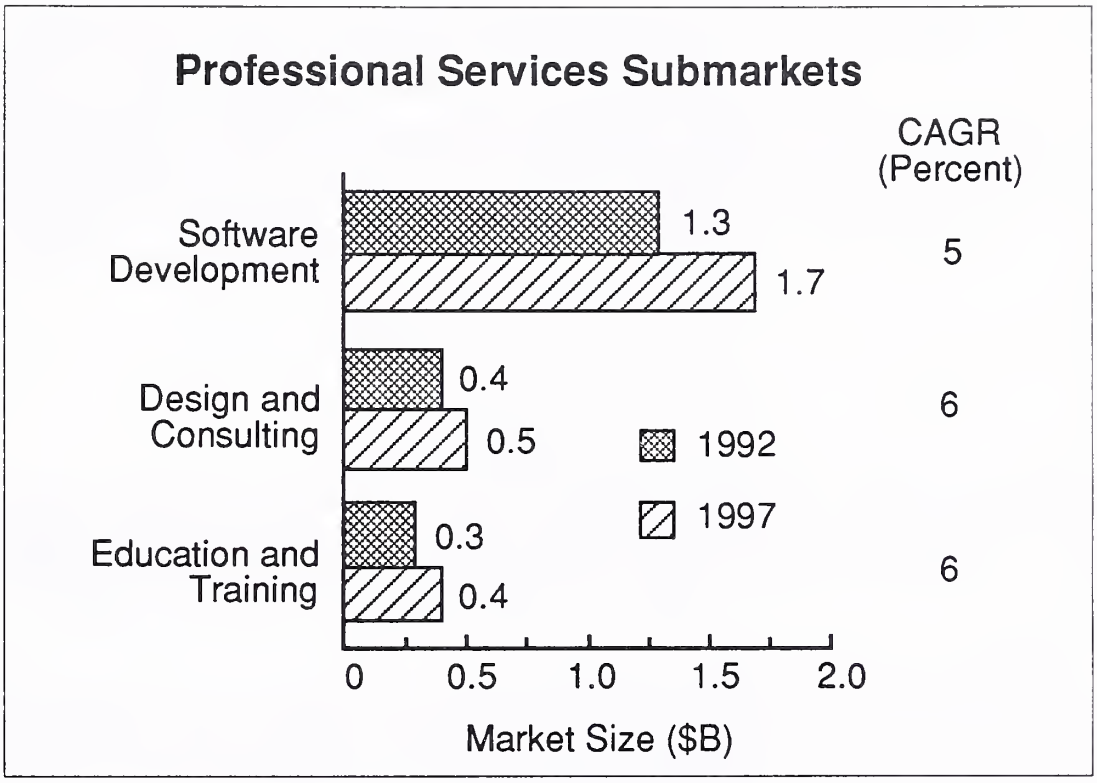
1. Programming and Analysis/Software Development

Programming and analysis services, also called software development, is forecast to grow from $1.3 billion to $1.7 billion in FY 1997 at a CAGR of 5%, as shown in Exhibit IV-4. 1991's forecast was $1.2 billion growing to $1.9 billion in FY 1996. Delays in a number of programs in Defense in FY 1990 and FY 1991 set back the level of spending, which is now being slightly accelerated to support the needed work.

This submarket includes:

- Hardware and/or software system design
- Custom software development
- Modification of commercial software products
- Software testing of custom and commercial packages
- Software conversion

EXHIBIT IV-4



- Maintenance of custom applications software
- Independent verification and validation (IV&V) of software packages prepared by other vendors

A number of programs planned for near-term procurement should sustain the projected growth. These include Integrated Systems Engineering and Joint Staff Automation for the Air Force, IPS and TCCS for the Army, PMIS and Shipboard Non-tactical ADP for Navy, the CIM project for DoD, Transportation's (ADP) support, and the expected award for integration support to the IRS.

The declining availability of programming skills in the federal government is the most significant factor behind the projected growth. Government staffing limits and the backlog of software maintenance tasks at most government data centers contribute to the demand for vendor assistance in this service mode.

Interoperability pressures—or, more specifically, the ability to exchange data—are the driving force behind the use of contractors in software development. Vendors can more readily provide the expertise needed to knit together different platforms and their applications software to accelerate data interchange.

2. Consulting and Design Services

IT consulting services in the federal market will grow at the CAGR of 6%, from about $400 million in FY 1992 to a little more than $500 million in FY 1997. This is a two percent improvement over the 1991 forecast, brought on by CIM/DISA initiatives and the continuing shortfall of systems experts in the federal workforce.

The types of services contracted include:

- Feasibility studies
- ADP requirements analyses
- Systems audits
- System engineering and technical direction (SETD)
- System engineering and technical assistance (SETA)
- Software engineering and technical assistance

The primary demand factor is agencies' need for assistance in producing the technical justification for planned improvements in information technology resources during this period. Agencies are understaffed in the technical planning and evaluation areas.

This market will continue to experience Congressional pressure on agencies to minimize or eliminate entirely the use of outsiders (and previous government employees) in functions perceived as governmental management.

3. Education and Training

Education and training services relate to information systems and services for the user, including computer-aided instruction (CAI), computer-based education (CBE), and vendor instruction of user personnel in operations, programming and software maintenance.

The government normally contracts for the following separately from systems integration programs:

- Training programs
- Books and manuals
- Seminars
- Automated training systems

This delivery mode eroded under both budget pressures and inclusion of the services in systems integration programs. This submarket is recovering in response to needs for training in new software, tools and sophisticated hardware.

The forecast is for a 6% CAGR improvement, from more than $300 million in FY 1992 to $400 million in FY 1997.

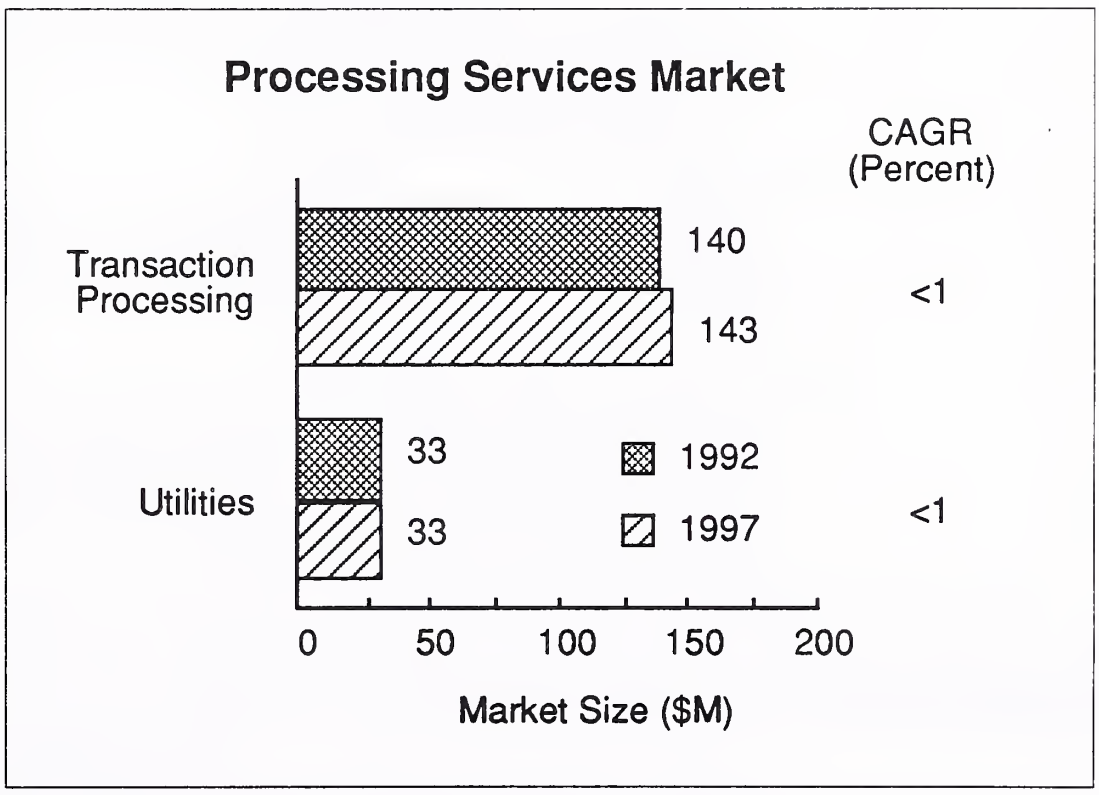
Computer training was provided in-house by a number of larger agencies under their regular administrative budgets. Courses for end-user computing, local-area networks, distributed processing and new software tools will be generated by industry.

C
Processing Services

Processing services includes transaction processing with some batch-mode workloads. It previously included systems operations on contractor-owned equipment (COCO), now part of a separate delivery mode—systems operations—discussed later.

For the last half of the decade of the 1980s, this delivery mode continued to decline as installation of new distributed processing systems and PCs depressed the need for outside processing support. Exhibit IV-5 shows the continued decline of transaction processing.

EXHIBIT IV-5



1. Transaction Processing

Transaction processing—previously called remote computing services (RCS) and identified as ADPE time in the federal IT budget—has continued to decline (in growth rate) since FY 1984, when growth was projected at 13%, to less than 1% for this period.

Beginning with the IT budget for FY 1989, the funding for Medicaid and Medicare insurance, provided by HCFA (Health Care Finance Administration) of HHS, was deleted and moved into a states-aid category.

In addition, the demand for services under GSA's Teleprocessing Services Program fell from $80 million in 1983 to $26 million in 1989, especially for support under MASC (Multiple Award Schedule Contracts). GSA advised all agencies in May 1990 that TSP was terminated at the end of FY 1990 (September 1990).

Transaction processing requirements must now be procured through RFPs, which may require processing requests to GSA for a DPA (Delegation of Procurement Authority). The communications must be acquired through FTS-2000, in a separate action by the agency.

Network services were separated from this delivery mode in 1989 and are now included with the communications market forecast.

2. Utility and Batch Processing

Small amounts of utility and batch processing continue to appear in agency IT expenditures, but have declined to about $30-$35 million per year. The bulk of this work appears in the Education Department and DoD budgets.

Continued budget-deficit reduction actions that delay implementation of upgraded systems could lead to a stronger market than currently predicted, to meet agency productivity goals and mission objectives. This could support vendor-supplied disaster recovery systems, if the agencies cannot install equipment to satisfy their needs.

D
Software Products

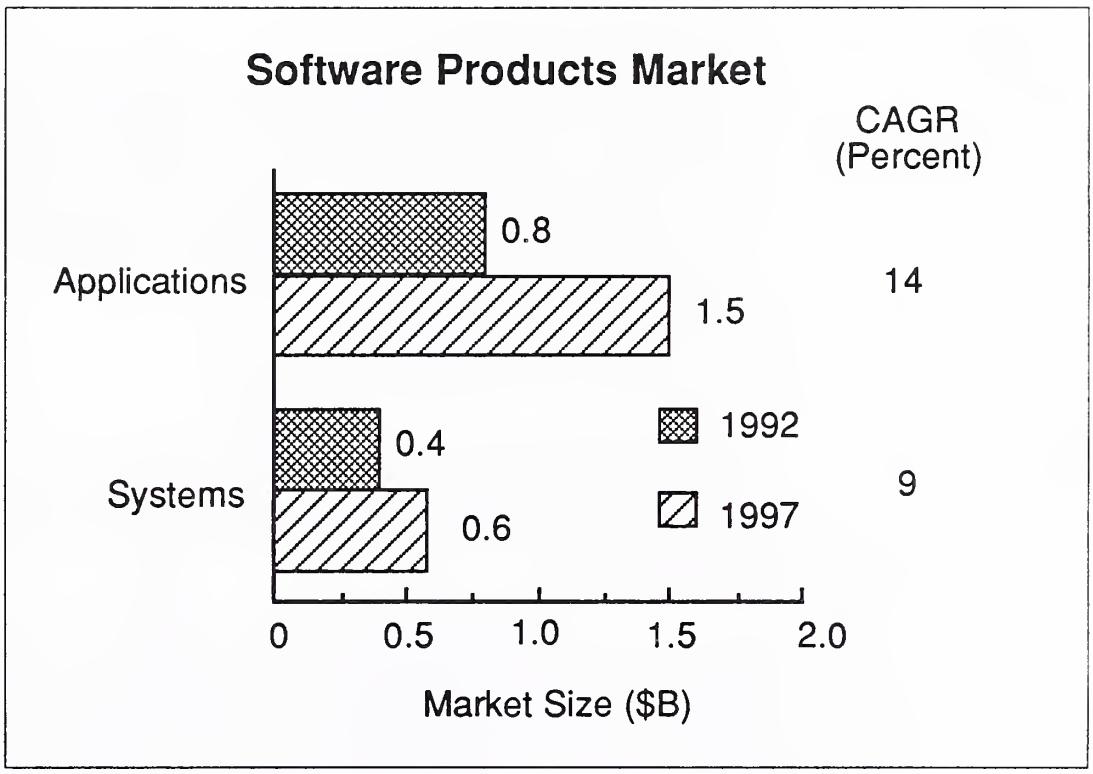
As shown in Exhibit IV-6, the federal software products market is expected to increase from $1.2 billion in FY 1992 to $2.1 billion in FY 1997 at a compound annual growth rate of 12%. This is less than the 17% forecasted in 1989 and 13% in 1990, partly because of competitive pricing and the impact of requirements contracts that specify the application packages to be furnished in quantity.

1. Applications Software

INPUT divides the software products delivery mode into applications and systems. Applications software includes accounting, human resources, procurement and mission-unique support software. This latter category concerns software that directly supports the mission of the agency. The following examples are typical:

- IRS uses software to assess the auditability of the tax-payer's return.
- DLA uses software to track the movement of supplies at depots and warehouses.
- NASA uses software to evaluate the usability of pictures transmitted from space.

EXHIBIT IV-6



Applications software outlays are driven by the large PC inventory and updates of existing mainframe suites. Price competition is considered the key factor in the lowered CAGR of 14%, down from 15% in 1990. The market is expected to increase from about $800 million in 1992 to $1.5 billion by 1997.

As a result of budget constraints and heavy pressure from OMB, many agencies are beginning to view their software requirements in other than unique terms. When they have a fairly standard application, particularly an administrative application, they acquire standard packages more often than before. This leads vendors to increase development of packages that are suitable for government use and government-oriented marketing efforts.

Increasing emphasis is being put by GSA, GAO, OMB and NIST on the use of standardized applications. Commercial-grade off-the-shelf packages that have been modified to meet government needs are being acquired.

Beta testing of packages by agencies leads to bid solicitations for specific types of platforms under the QPL (Qualified Products List) procurement ground rules. This is particularly pertinent in the requirements-type (indefinite quantity, indefinite schedule) contracts.

One area receiving much attention is standard financial packages. The Joint Financial Management Improvement Program (JFMIP) issued a *Core Financial System Requirements* document for agency use. In connection with this JFMIP requirement, GSA issued contracts to several additional vendors for core-compliant software.

2. Systems Software

Systems software is usually sold with the hardware. Later purchases after installation include DBMS, compiler controls, accounting and chargeback software, communications and software development tools. There is increasing emphasis on productivity tools and CASE. These interests are expected to improve the market from $415 million in 1992 to $635 million in 1997, at a CAGR of 9%.

3. Software Modularity and Reuse

Two areas of vendor concern are the current and CIM-planned availability of government software for use by other agencies at minimal cost, and constraints on commercialization of federal software under existing copyright laws.

The current federal centers—NTIS, National Energy Software Center and NASA's COSMIC (Computer Software Management and Information Center)—catalog tapes, disks and documentation of both federally generated and federally funded software for use by other agencies. Commercially available software is listed for information, but requires agreement or lease from the vendor-owner.

DISA, under the CIM Initiative, proposes to specify the preparation of Defense software in modules and storing them in a DISA Software Reuse Center, with electronic access for potential users. Industry and some agency software experts note the attendant problems of increased cost of modularity and determination of ultimate responsibility in the event the software fails to meet specifications.

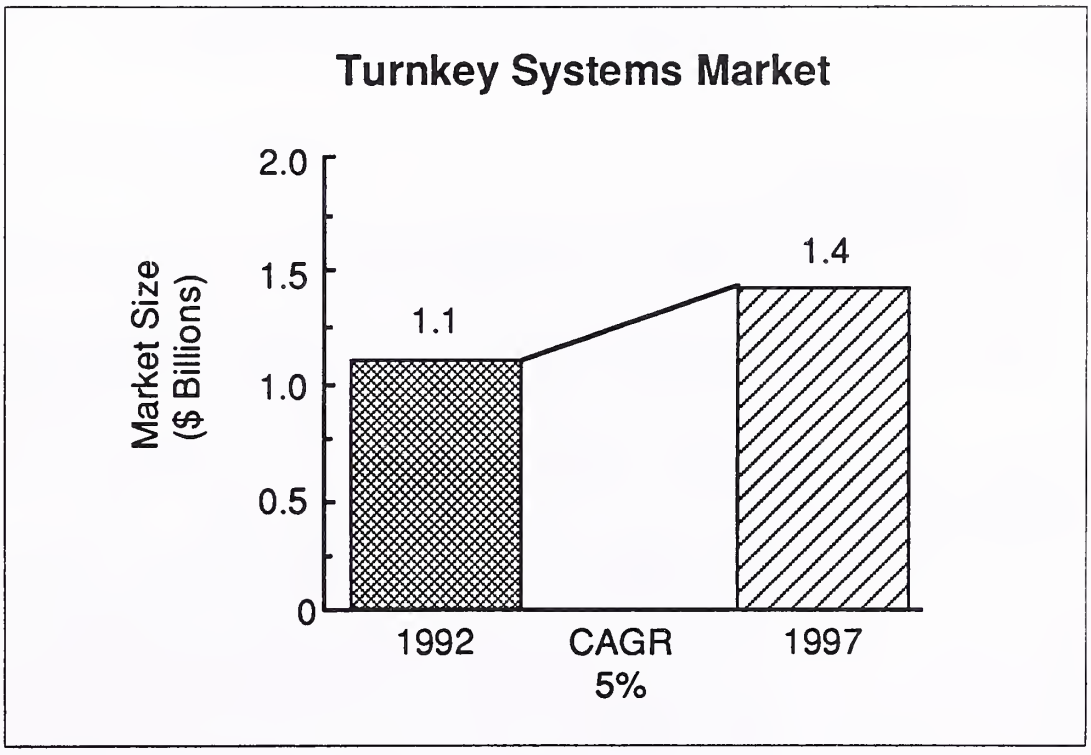
Current law prohibits the copyrighting of federally developed software, and constrains efforts to transfer the software to industry, according to senior administrators, patent attorneys and technology transfer officials. The GAO submitted recommendations to Congress for modifying the current statutes.

There is a strong feeling among IT officials and GAO that the newer capabilities of software technology have been substantially oversold. The continual release of newer, better, faster, more flexible, more user friendly software puts at risk the substantial current inventory and the improvement of data interchange between in-place systems.

E
Turnkey Systems

Turnkey systems are value-added packaged hardware and software solutions to specific applications requirements that satisfy, with few modifications, commercial, industrial and government needs. This delivery mode's federal growth rate results from sharp Defense budget cuts in custom-system appropriations. Exhibit VI-7 shows it will increase from $1.1 billion in FY 1992 to $1.4 billion in FY 1997.

EXHIBIT IV-7



Scientific and engineering applications represent the largest area of agency turnkey system use. These include CAD, CAM, CIM, and data collection packages. On the civilian side, Commerce, NASA and Energy have the greatest need for these systems, and support most of the civilian growth. Defense also has growing requirements in this area, but currently lacks the means to satisfy these needs.

Document handling represents the second-largest application area. This includes, among other applications, DoD's initiatives on CALS (Computer-Aided Logistics Support). However, some CALS-related initiatives were cut from the current budget and others will be impacted by the DoD CIM program. Other document-handling applications of interest to federal agencies include library, graphics, mapping and publishing systems.

Other turnkey applications include:

- Human resources
- Fleet scheduling
- Maintenance tracking
- Medical drug information
- Financial systems

Turnkey systems being procured by federal agencies include custom design and applications. The vendor provides the entire system, including applications software and special peripherals. Also, vendors install the system, train client personnel to operate it, and provide service during the warranty period.

Some agencies are initiating systems integration procurements whereby the standalone (also called "Stovepipe") systems can be connected to mainframe and distributed data base systems.

F

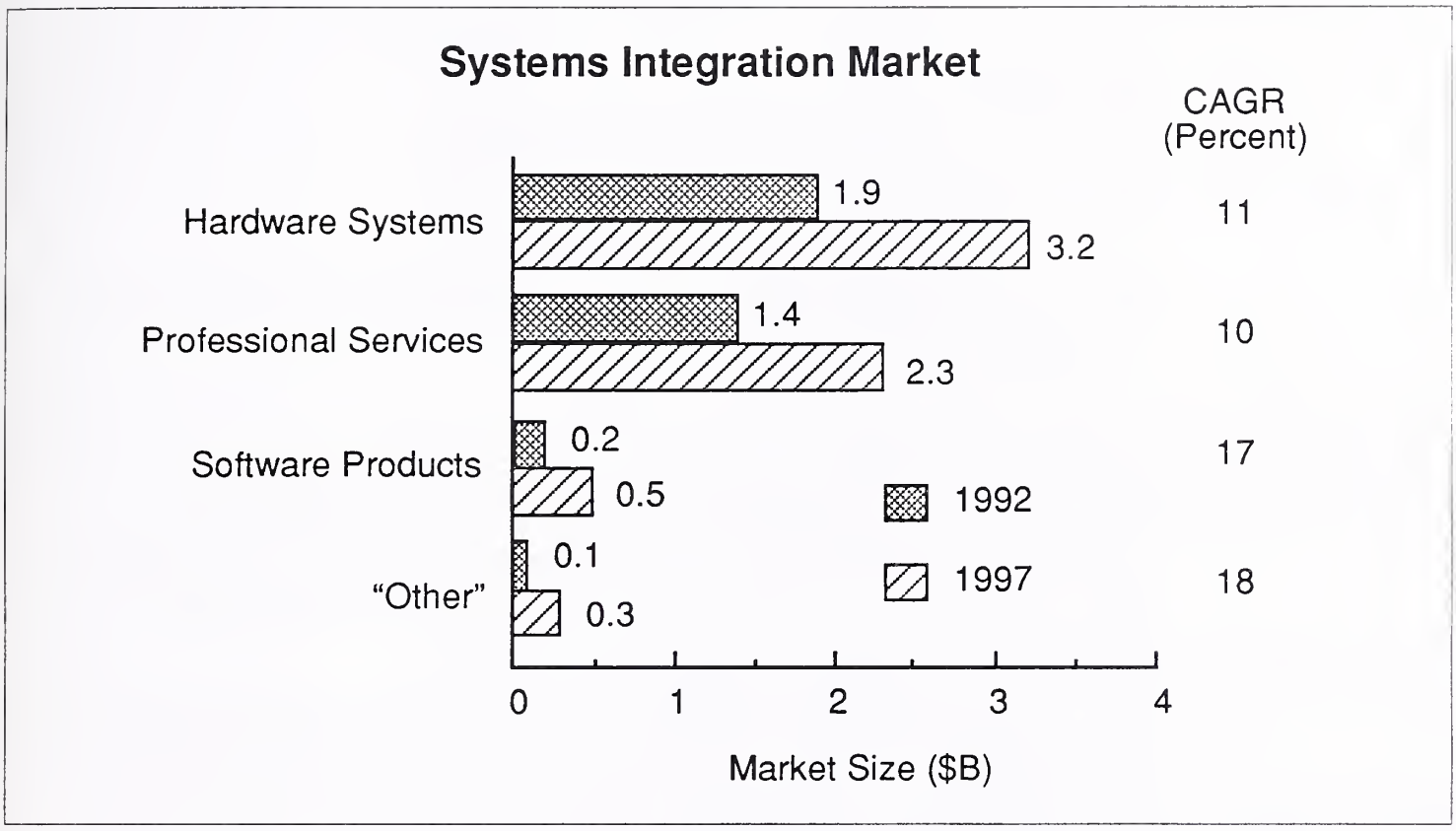
Systems Integration

1. Overall Market Potential

The market for systems integration is expected to grow at a compound annual growth rate of 12%, from $3.7 billion in FY 1992 to $6.4 billion in FY 1997, as indicated in Exhibit IV-8. The rapid growth of the federal systems integration market is fueled by the government's focus on upgrading its in-house information resources.

The professional services component of the systems integration forecast shows the lowest growth rate as agencies modernize and acquire additional systems. The equipment portion of SI was flat in the late 1980s, reflecting sizable budget cuts at many agencies, especially on the Defense side. But beginning in FY 1991 and continuing through FY 1995, there is a sizable increase in equipment acquisitions, replacing older mainframes and incorporating large numbers of workstations and PCs.

EXHIBIT IV-8



2. Professional Services

Professional services grew at 17% per year in FY 1987 to 1989, but dropped to 15% in FY 1990. Expenditures in 1992 were $1.4 billion, the amount forecasted for 1991. Delays in approval of several DoD systems by CIM, and problems with Treasury programs accounted for all of the shortfall. 1997 outlays are now expected to reach $2.3 billion, less than the $2.9 billion predicted in 1991, for the same reasons.

This submode grew at 17% per year in 1987 to 1989, but dropped to 15% in FY 1990. Outlays for professional services were 51% of the total spent for SI. Since then the proportion has declined to 40% in FY 1992, and may not gain parity with equipment outlays until after 1995.

The services included in the this market are:

- Project management
- Consulting services
- Design services

- Integration services
- Custom software development
- Education
- Training
- Documentation
- Operation and maintenance (systems operations) (only if specified in the contract).

3. Equipment

Earlier, the amount of each project spent on equipment declined as a percentage of the overall project cost. The reduction was attributed to the progressive decrease in the cost-per-MIP. But since 1990, the amount has risen to the level of about 1988, as the projects include more terminals/ PCs for users and extensive networking is needed.

1992 expenditures were $1.9 billion, and are now expected to rise to $3.2 billion in 1997, at a CAGR of 11%, and about 51% of the total expended. More of the CPUs originally planned for reuse have become obsolete and need replacement. LANs and network management equipment are also adding to the rise in hardware costs.

4. Software Products

The size and growth rate of the software products component of SI is unchanged since the 1991 forecast. Outlays are $230 million in 1992, growing at 17% CAGR to $505 million in 1997. Certainly, part of the unchanged spending profile is due to the increased use of microcomputer application products, which have undergone substantial price reductions.

Another factor is the continuing conversion of existing applications to minimize the delays in cutting over to the new system. A significant problem in creating new systems from old ones is the matter of site licenses and restricted use of commercial software that is copyrighted.

5. Other Services

The "other services" category, although relatively small in the federal market compared to the commercial market, includes transaction processing and network services during the implementation phase, site preparation, mechanical engineering, data/voice communication services and initial data processing supplies. This segment is expected to grow at an 18% CAGR.

6. Trends

A number of awarded and near-term projects are visible that are driving the market:

- RCAS and IPS in the Army at $182 million and $17 million
- AWIPS-90 for NOAA at $122 million
- ALMRS (now called ADP modernization) for BLM at $158 million
- MARK II system for USGS at $100 million
- Treasury's System 90 at $57 million
- Document Processing System for IRS at $196 million
- State's Co-processing Facility at $39 million

Currently, civilian SI spending exceeds that of Defense by almost half a billion dollars. This reflects current budget constraints in the Defense Department. INPUT expects these constraints to continue throughout the forecast period, largely driven by CIM plans to reduce Defense systems spending by $2-$4 billion by 1995.

All major SI initiatives are not being cancelled; some may be deferred or stretched out. As a result, the Defense market will not surpass the civilian market demand over the next few years.

Most SI projects include provisions for communications. With the advent of FTS- 2000, cost estimating became difficult in the absence of firm rate data from the two FTS-2000 contractors, AT&T and Sprint. The GSA must now be involved in providing communications.

Risk management is heavily emphasized in the federal market. Despite system complexity and the government's reputation for offering incomplete requirements, the agencies want operating solutions-not just the offering of sophisticated, interesting technology. Caution must be tempered by provisions for technology insertion (for instance, imaging systems) in the future.

G
Computer Equipment

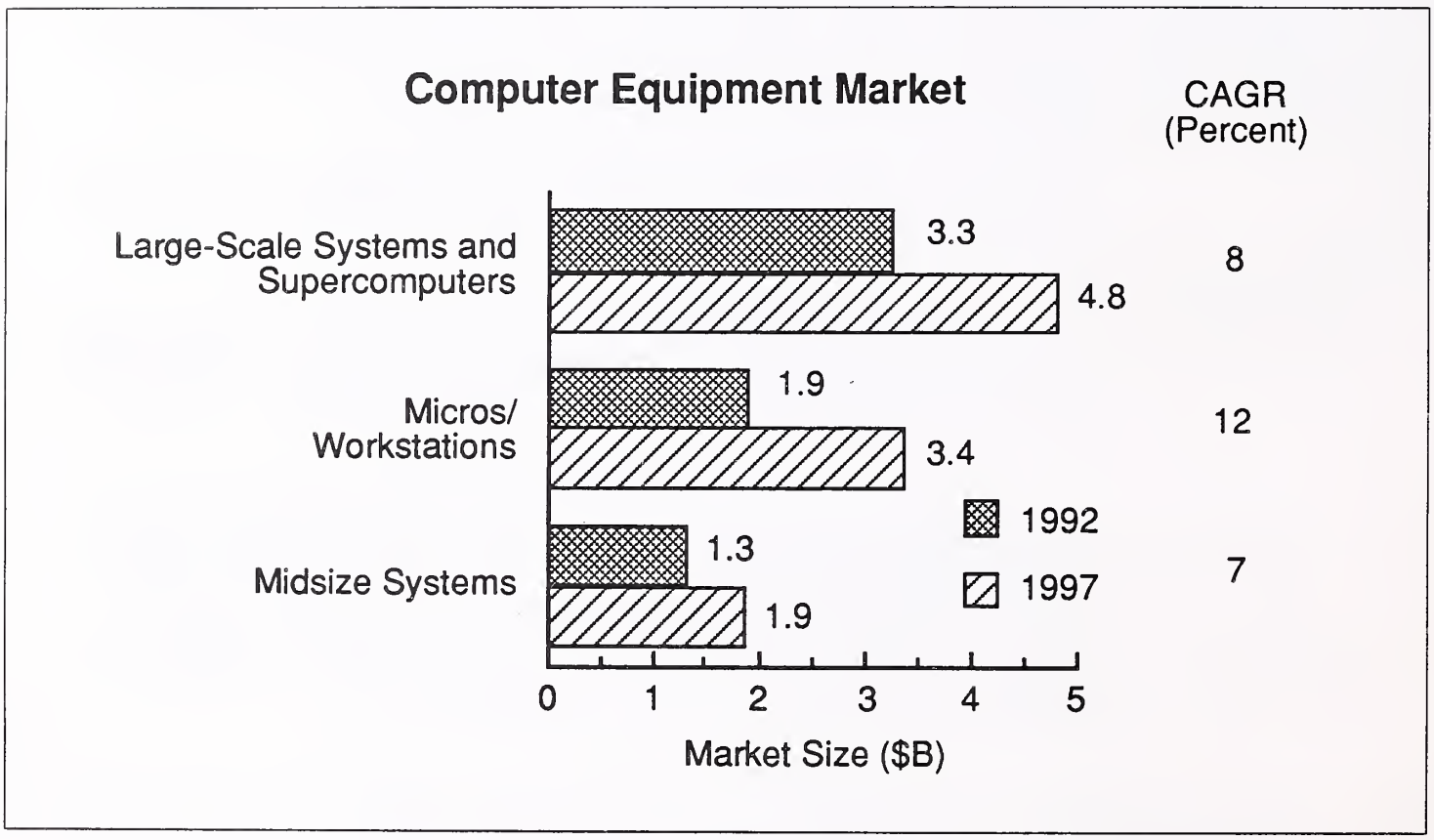
INPUT focuses on the information services industry, and does not treat equipment as an independent research area, except for the components of systems integration and turnkey systems delivery modes. Federal vendor client interest in equipment, including PCs and office information systems, led to the preparation of several equipment-oriented reports and a forecast of likely trends, beginning in 1988. The results of INPUT's current federal research is seen in Exhibit IV-9.

1. Equipment Overview

In FY 1992, the federal agencies spent about $6.6 billion on computer equipment, with the primary emphasis on large-scale systems, which includes supercomputers. As presently seen, this market is expected to grow at a CAGR of 9% to reach $10.1 billion in 1997. This rate is 1% higher than forecast last year, with the principal changes appearing in both microcomputers and large-scale systems.

Some of the planned IDIQS (Indefinite Delivery-Indefinite Quantity) requirements contracts could exceed reported request levels, if past experience applies in the near future.

EXHIBIT IV-9



2. Downsizing

Application downsizing is moving many midsize computer-based operations into large microprocessor-based workstations and supported PCs. Large mainframes are becoming depositories for both data and applications software that can be downloaded to low-end, independently operated hardware.

3. Acquisition Trends

Microcomputer-based workstations and personal computers are being acquired via several avenues. The *Five-Year Plans* indicate continuing intention to acquire hundreds of thousands of units through requirements contracts. Several medium to large programs include the acquisition and installation of hundreds of terminals.

4. Equipment Modernization

Mainframes of circa IBM 360/370 have been largely replaced because they are no longer maintainable. More modern architectures off-load overhead functions from the mainframe, permitting it to operate at or near designed transaction speeds. Furthermore, replacement programs of the late 1980s moved into both higher capacity mainframes and distributed systems that are minicomputer-based.

In the federal market, system upgrades and expansions involve replacement or addition of specific ADP elements. The most recent *Five-Year Information Technology Plan* indicated a significant investment for increasing memory systems and data communication hardware. New leases are planned for newer technology mainframes and operating software when capital investment funds are not available.

For the 1990s, a number of expansion projects involve the addition or extension of networks. Some projects require networks to serve workstations. Still others will connect microcomputers and minicomputers, which in turn are, or will be, tied to centralized data bases. Software for these projects is either acquired separately through professional services vendors or developed in-house.

5. High-Performance Computing

Traditionally, federal agencies have used supercomputers for highly scientific and technical applications. NASA and the Department of Energy own the bulk of these systems, but major DoD agencies also have supercomputers installed in both classified and unclassified establishments.

As federal computing becomes more complex, INPUT expects agencies to find new applications for supercomputers, thus fueling continued market growth. INPUT's PAR data base currently contains 20 programs involving supercomputers.

NASA has developed a controversial policy for supercomputer procurements. It is allowing vendors of Japanese equipment to bid on production-oriented systems, such as the Engineering Analysis and Data System (EADS II) at Marshall.

However, NASA is precluding foreign participation for research-oriented systems, such as Ames' High-Speed Processor III initiative. INPUT expects Administration trade policy, rather than procurement policy, to resolve this controversy.

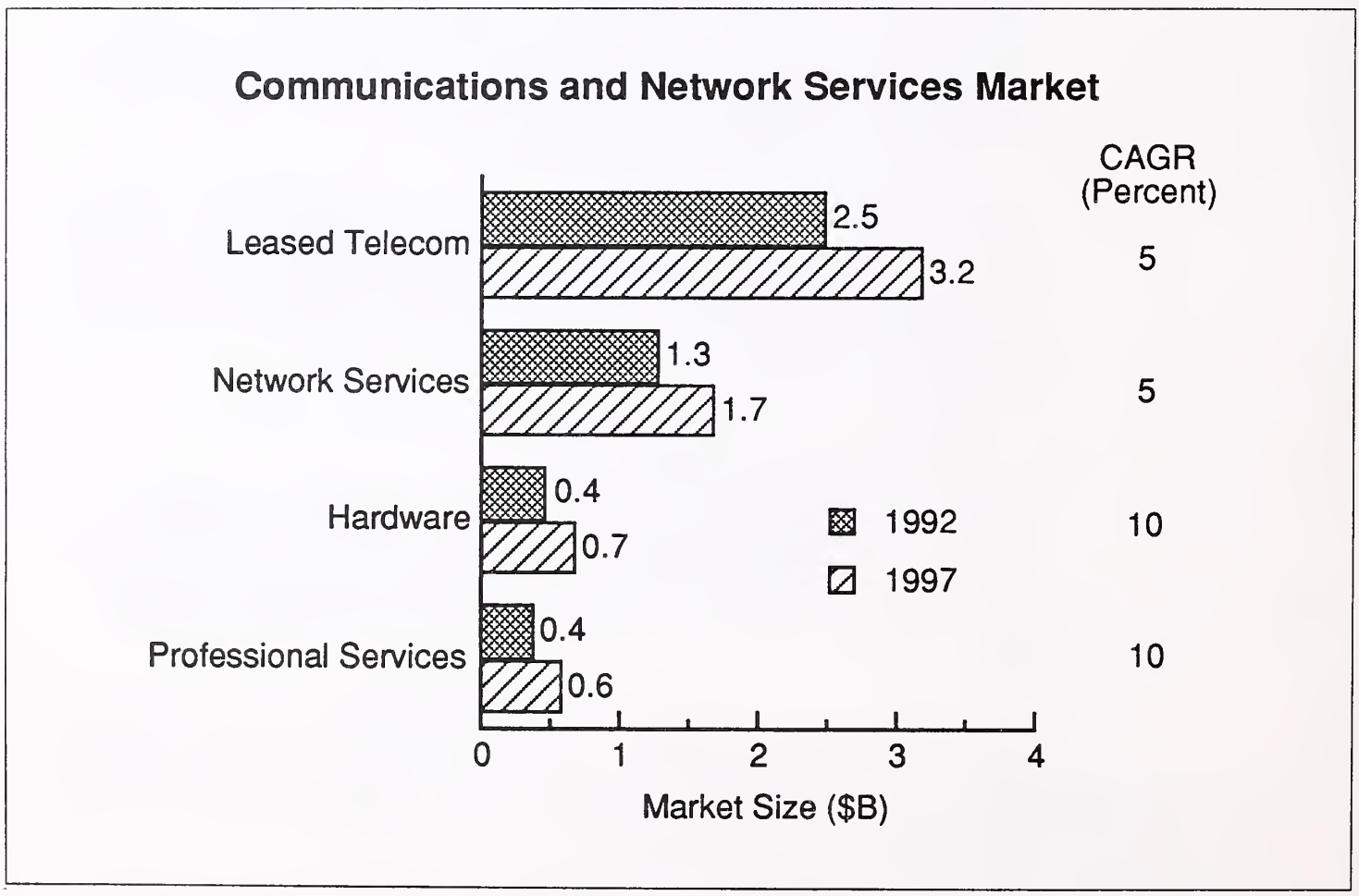
H

Communications and Network Services

1. Overview

The federal market demand for communications and network services will increase from $4.5 billion in FY 1992 to $6.2 billion in FY 1997. The market for telecommunication products and services will experience a 6% CAGR through the five-year forecast period, as shown in Exhibit IV-10, which is back to the level predicted in early 1990.

EXHIBIT IV-10



2. Components

Network services is divided into two major segments: electronic information services—selling information to users—and network applications—enhanced transport of user information processing needs. Earlier INPUT budget estimates developed from OMB A-11/Section 43A&B data were substantially undervalued, since the funds were buried in the general telecommunications budget requests.

While research into all of the non-FTS-2000 networks is not complete, the 1992 expenditures look like $1.3 billion, increasing to $1.7 billion in 1997, at a CAGR of 5%. This is nearly two orders of magnitude greater than was detected in the 1991 forecast.

Agency network services contracts typically last seven to ten years, and rarely are terminated by budget constraints. Separate new and replacement acquisitions may be deferred or cancelled if an enhanced FTS-2000 can meet their needs.

Leased (tele)communications circuits, principally obtained through the FTS-2000 contractors, include services also leased from the RBOCs (Regional Bell Operating Companies) and the independent suppliers. The numbers are lower than the 1991 forecast because that included the previously unidentified network services.

These expenditures are expected to grow from $2.5 billion in 1992, to $3.2 billion in 1997, at a CAGR of 5%. These values appear to be a lot less than widely noted in Congress; they should be at least twice the values noted, but the budget requests do not identify more than noted. INPUT assumes that lot of intralata leases are buried in administrative funds.

Professional services and equipment (hardware) are quite small in comparison to the media costs. Professional services is likely to grow from 1992's $375 million in 1992 to about $600 million in 1997, at a CAGR of 10%.

Equipment, largely CPE (Customer Premises Equipment) and ASP (Aggregated Switch Procurements), cost nearly $440 million in 1992. It is expected to increase to about $710 million in 1997, growing at 10%. The hardware market is more competitive than the other components because the specifications permit use of a variety of sources.

3. Prospects

A number of projects listed by the agencies are funded outside the FTS-2000 system. These include:

- Agriculture: Communications Network (AGCOMNET)

- DISA: International Switched Voice System
- Energy: Los Alamos Integrated Communications System (LAICS-II), Kansas City Information Distribution System (KCIDS), and Oak Ridge Waste Information Network (WIN)
- FEMA: Regional Integration of TeleCommunication
- HHS: Connectivity Acquisition
- Interior: GEOCOM Customer Premises Equipment
- Justice: Integrated Digital Communications System (IDCS)
- Navy: GOSIP Gateway
- NASA: GSFC-EOS Communications Network, MSFC-PSC Network
- National Archives: ICASS Integrated Communications
- Transportation: FAA-Operational Enroute Communications, FAA-Operational Flight Advisory/Weather Communications, Automated Digital Telecommunications Network
- Treasury: Telecomm Services (TCS)

4. Trends

Despite the potential implementation of the Gramm-Rudman-Hollings Act, INPUT believes that the effects of budget constraints will be mitigated somewhat in the federal communications market segment. Budget reductions actually may increase federal dependence on communications services. Teleconferencing and electronic message distribution will be emphasized to reduce travel and other costs.

Although the federal communications market has shown signs of increasing volatility, INPUT continues to believe that it will show sustained growth through the 1990s. Despite market growth in terms of spending, the number of distinct opportunities will probably decrease.

Other factors that will drive the federal telecommunications market include:

- Agencies are more demanding and sophisticated in their communications requirements, either riding FTS-2000 or, when appropriate, initiating their own requirements-type contracts.

- Pressures continue in Congress to further limit the services available on FTS-2000 from the present contractors, AT&T and U.S. Sprint.

- Technological advances will change the market character. For example, as better network management tools become available, agencies will come to expect resulting economies and efficiencies. The network management market is expected to double during the next five years.

- Competition is becoming more intense, as evidenced by MCI's successful challenges. Since this market still shows some of the vestiges of monopoly, the increase in competition will be even more dramatic, especially in the earlier phases of full digital service, which will enhance data communications capabilities.

- Communications security requirements will likely increase as a result of the Computer Security Act of 1988, as well as other forces. Most agencies consider communications to be the weakest link in information processing. Security considerations will prevent much interaction between local-area networks in DoD, at least in the near future.

I
Electronic Commerce/Electronic Data Interchange

1. Overview

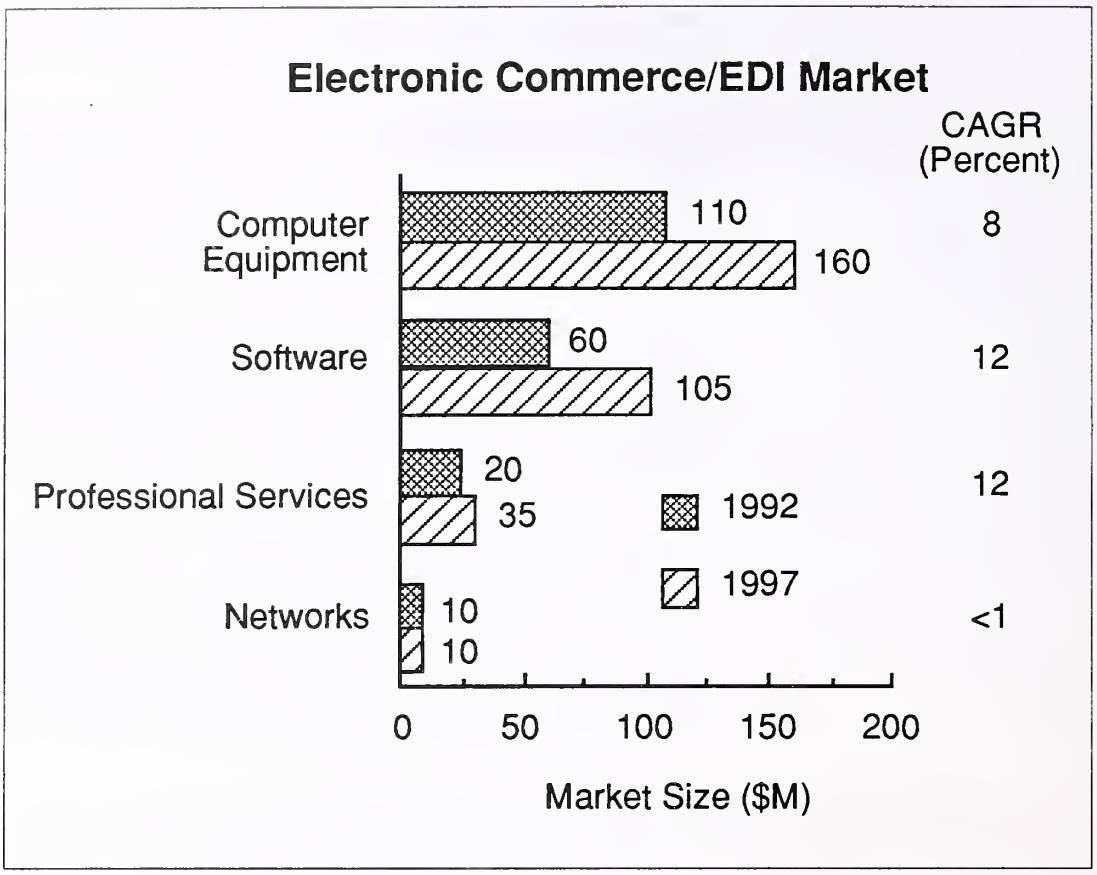
Electronic commerce/electronic data interchange (EC/EDI) is receiving increased attention in the government. Although its growth in the federal market lags behind that in the private sector, it is still becoming quite popular.

EC includes several modes: procurement (EDI), logistics (CALS), finance (EFT), benefits (EBT), drawings (EDT), filing (EF) and other data. INPUT expects the federal EC/EDI market to grow from $200 million in FY 1992 to $310 million in FY 1997, as shown in Exhibit IV-11.

2. Components

Currently, growth is occurring primarily in the software products area, reflecting OMB's growing emphasis on packaged software, at the expense of tailored software development (included under professional services). Expenditures of $60 million in 1992 will grow at a CAGR of 12% to more than $105 million in 1997.

EXHIBIT IV-11



A gradually improving federal computer equipment market will increase outlays from about $110 million in 1992 to $160 million in 1997 at a CAGR of 8%, which sustains last year's projection. The unusual fact is that EC/EDI can be processed by conventional hardware and only slightly specialized software. It appears that the current systems are being set up for standalone operation.

Professional services growth from this year's $20 million to $35 million in 1997 suggests that planning and implementing EC/EDI is more of an organizational rather than a technical problem.

The surprise in this specialized market is the low level of network expenditures encountered. Slightly less than $10 million in 1992, going to somewhat more than $10 million in 1997 is hardly a ripple in this budget pond. The special services of these networks appear to be only an early phase to conversion to a fully equipped service. There is also a growing trend among some network providers to heavily discount their federal offerings.

Unlike most other delivery modes, EC/EDI prospects are actually enhanced by budget cuts. Federal managers can save much of their administrative expense by reducing paperwork. Greater automation of procurement, invoicing, human resources and other administrative functions through EDI will reduce expenses and increase accuracy and efficiency.

With the exception of the DoD CALS effort, no agency is taking a lead in EC/EDI. However, other agencies applying EC/EDI consider it indispensable to facilitate more efficient, cost-effective operations. Through pilot programs applied in traditional fixed-price environments, agencies will increase their operating efficiencies with EC/EDI.

3. Prospects

Agencies are gaining greater awareness of EC/EDI through several highly visible EC/EDI applications being implemented through recent agency awards. These include:

- The SEC EDGAR Project for electronic filing of corporate documents
- The Navy EDMICS Program for an engineering and image processing system
- The GSA Federal Supply Service Program for sending invoices and bills of lading to suppliers
- Defense Logistics Agency's EDI Value-Added Network, and supplier connections under CALS (Computer-aided Automated Logistic System)
- Transportation's Automated Document Transfer System

4. Trends

EC/EDI is now being included in system upgrades, not just in standalone EC/EDI acquisitions. It is still viewed by most agencies as a more productive alternative to other data interchange processes.

The policies and regulations impacting EC/EDI are still evolving. OMB is still drafting a policy directive for agencies that will encourage EC/EDI use. During 1988, the DoD released the Taft Memorandum to establish EC/EDI standards and paperless processing for accounting, distribution and payment systems at the DoD by the early 1990s.

The federal EC/EDI market will expand as advancements are made in standards. X.12 is already gaining a strong foothold among most federal agencies. Furthermore, NIST made X.12 a mandatory FIPS standard in 1990.

The international standard, EDIFACT, is recognized in some application areas, such as Customs, as the only standard that allows for full participation among trading partners worldwide. However, protocol differences between X.12 and EDIFACT may delay the standardization of federal EDI.

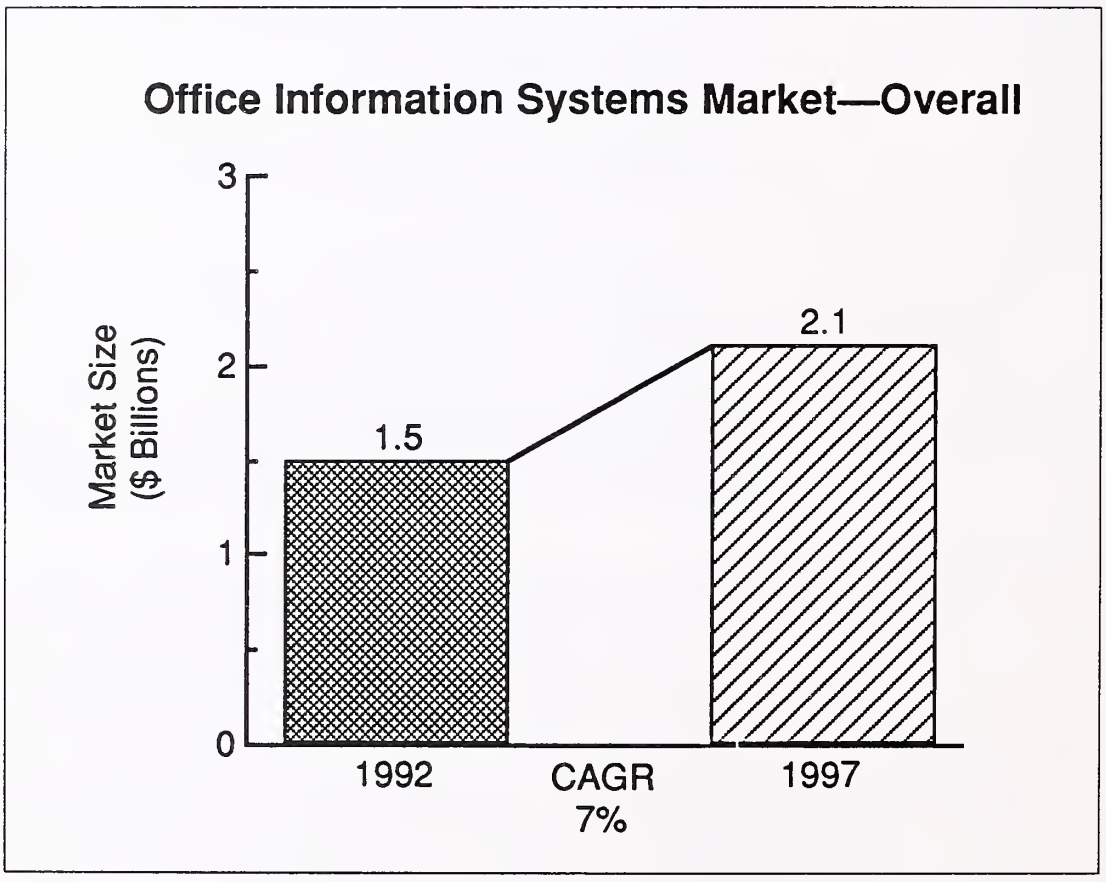
Agencies will use GOSIP to integrate their multivendor networks and systems. However, INPUT expects many Defense agencies to continue to use TCP/IP, an incompatible approach, for the next three to five years.

J
Office Information Systems

1. Overview

As shown in Exhibit IV-12, INPUT estimates that the federal government office information systems (OIS) market will increase from $1.5 billion in 1992 to $2.1 billion in 1997 with a compound annual growth rate of 7%. Demand for office systems appeared to have peaked three years ago, but seems to be increasing again, as the 1990 forecast called for only a 5% CAGR.

EXHIBIT IV-12

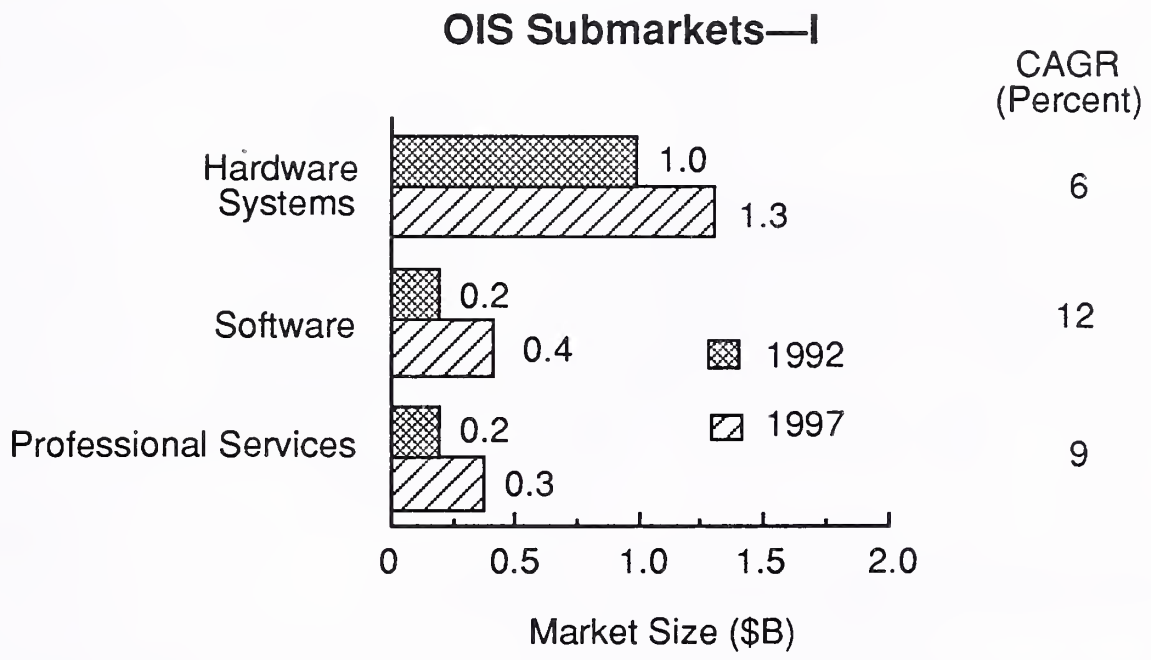


2. Components

Most federal OIS expenditures are concentrated in purchases of hardware components, but not to the extent seen in the late 1980s. Exhibit IV-13 notes that the CAGR will decrease to 6% in the next five years, going from $1.0 billion to $1.3 billion in 1997. That amount still accounts for more than half of the expected outlays.

Software products will exhibit the most rapid growth for the 1990s at a 12% CAGR, as more applications become available for office operations.

EXHIBIT IV-13



Some turnkey systems will continue to be ascribed for specific applications that are one of a kind in the office environment. These can be equipped to do a special assignment, like traffic control or vehicle tracking.

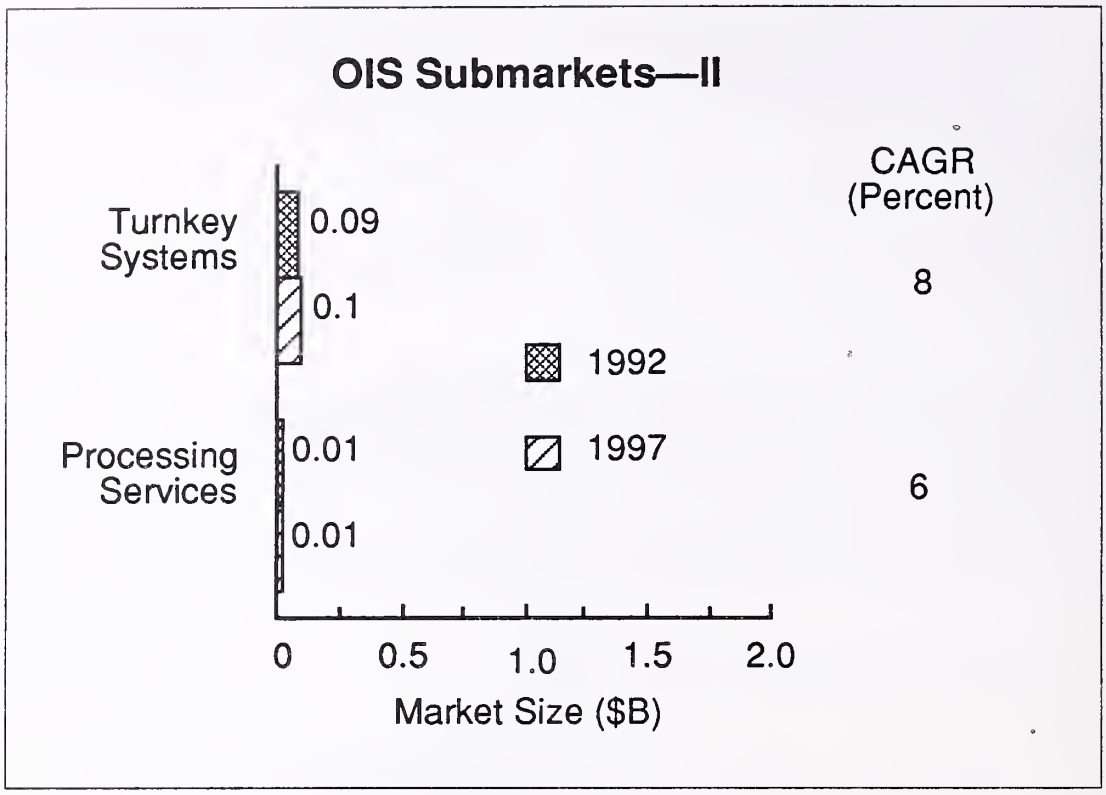
Growth is expected to be about 8% CAGR, to reach about $135 million in 1997. A small amount of processing services continues to be used for overflow support of major OIS. Both of these submarkets appear in Exhibit IV-14.

3. Prospects

A number of projects in this segment of the federal market indicate continuing interest. Please note that OIS is the object of several major systems integration programs.

- FBI: Field OIMS
- Air Force: Automated Records System
- Army: AIM Program, and MILCON (Construction) Program Administration System

EXHIBIT IV-14



- Agriculture: LM/Office Automation, and Inspection Coverage System
- Treasury: Data Administration Systems
- Veterans Affairs: Nationwide O/A
- Office automation projects at ED, State, and GSA

4. Trends

The nature of office information systems and the location of the intended support are changing. Today, OIS implies work units with users tied together via LANs, and institution-level processing distributed to workstations or work units linked to these larger processors.

The rapid technical performance improvements of PCs and workstations using 386 and 486 chips are rapidly expanding the variety of applications available in the office environment for management support.

Some OIS projects are called EIS (Executive Information Systems) or DSS (Decision Support Systems) to differentiate them from the earlier office automation context. As a result, many of these OIS automation efforts are influenced by, or under the control of, agency IS organizations.

Over the next five years, INPUT expects greater demands on agencies for office systems capabilities without an equally growing availability of OIS funds. This will force agencies to reorient their purchases toward more multipurpose systems instead of OIS-specific systems.

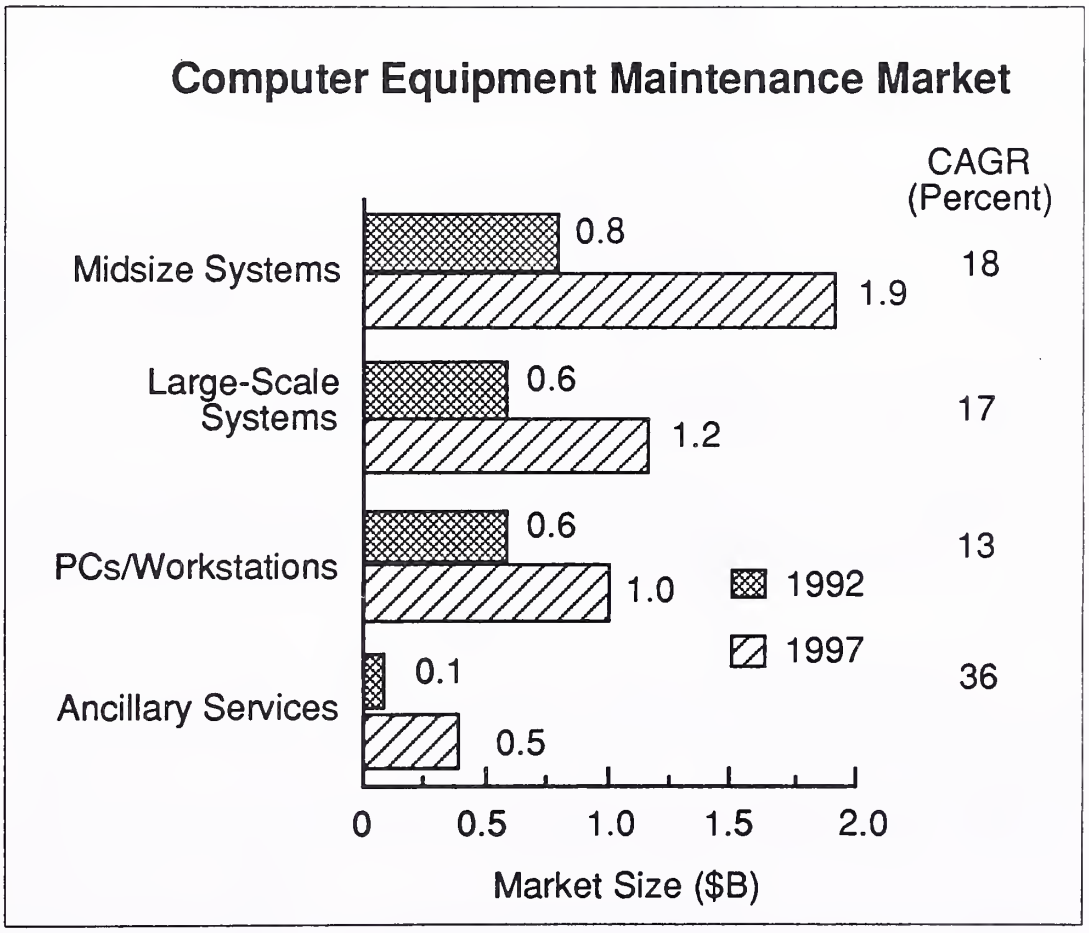
K

Computer Equipment Maintenance

1. Overview

Except for research conducted in the commercial market for customer services and third-party maintenance (TPM), INPUT had not previously analyzed the federal maintenance market. Client interests resulted in a Market Analysis Report produced in 1990 that provided some insight into the maintenance market. As seen in Exhibit IV-15, INPUT's most recent research reveals a market of $2.1 billion in FY 1992, with prospects of an 17% CAGR, that will reach $4.6 billion in FY 1997.

EXHIBIT IV-15



INPUT may not have captured the entire market. Some difficulty was encountered in separating IT maintenance from other non-ADP support functions at contractor-operated government facilities.

2. Size Emphasis

It is notable in Exhibit IV-15 that the largest segment of maintenance is associated with midsize systems, the largest amount of older ADP equipment in the government inventory. The Federal Equipment Data Center of GSA reported 9,493 units with average age of 12-13 years. The $840 million in 1992 is expected to increase to $1.9 billion in 1997, at 18% CAGR.

Large-scale systems, which include supercomputers, have been upgraded so that the average age is less than eight years. Outside maintenance is required for the larger machines because of their complexity. INPUT believes that the $560 million expended in 1992 will grow to $1.23 billion in 1997.

Despite the large number of PCs and workstations, their very newness results in low demand for maintenance support. About the time that they begin to require service, they are replaced by newer and more powerful machines. But $560 million was spent in 1992, and the addition of peripherals is expected to drive up maintenance expenditures to $1.0 billion in 1997.

3. Trends

Maintenance is provided by a variety of vendors, ranging from the OEMs of midsize to high-performance machines to third-party suppliers and maintainers. After some years of inattention to mixed-brand installations, the OEMs recognize the desirability of account control—where upgrades can be accomplished piecemeal, with potential pre-eminence of incumbent equipment maintenance firms.

Maintenance of customer-premise equipment in the communications environment was separately treated in that market area. Further investigation of the maintenance market may reveal more details, including specific agency trends and market shares of the leading vendors.

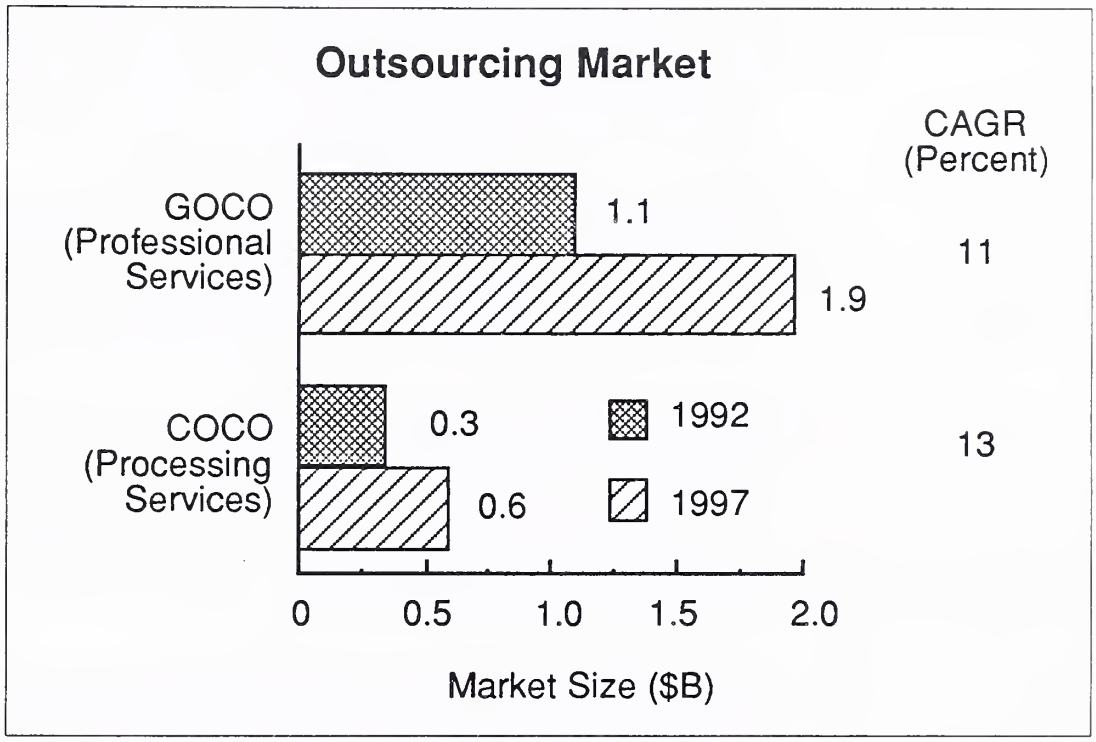
L
Outsourcing

1. Overview

The forecast in this market has been separated from the professional and processing services markets. The two modes of COCO and GOCO are combined to provide a comparison with the commercial outsourcing market.

As noted in Exhibit IV-16, the federal systems operations expenditures are $1.5 billion in FY 1992 and expected to grow at a CAGR of 10% to $2.4 billion in FY 1997. The growth rate will increase slightly from the 1991 forecast, but is not expected to reach the 15% level predicted in 1989 and 13% in 1990.

EXHIBIT IV-16



2. Systems Operations

Systems operations began to grow again on FY 1990, after experiencing CAGRs of 6%-8% since the cutbacks of FY 1983, when a number of new systems were implemented. The turnaround began with staffing restrictions and slowdown of new system acquisitions imposed by the Gramm-Rudman-Hollings Budget Control Act and a slowdown of Defense spending.

The professional services segment (Government-Owned, Contractor-Operated) is currently expected to improve at 11% CAGR, despite expectations of data processing center consolidation in Defense under DMRD-918. The dislocation of federal staffs is not expected to adversely affect the laboratories and experimental centers where the largest GOCO contracts are awarded.

COCO (Contractor-Owned, Contractor-Operated) opportunities are fewer in number and contract value—about a fourth of the GOCO market. INPUT is optimistically showing a CAGR of 13%, because the agencies cannot fund adequate disaster recovery facilities. A number of agencies, including DoD's CIM, are examining outsourcing of most data centers as a way of increasing productivity at a stable and predictable cost level.

3. Trends

A number of new SO programs have been added to those due to be recompeted in the next few years. The leading COCO program is FAA's CORN, worth $1.5 billion over a ten-year period.

Defense projects include Joint Staff Automation and WWMCCS O&M for the Air Force, Laser System Test Facility for the Army, and Navy programs for PMTC Support, Science and Engineering Center Support, and PEPSU Software Maintenance.

HHS programs include the Administration and Scientific ADP Services Contract, and Justice has the Automated Litigation Support recompete worth $130 million. The Bureau of Labor Statistics at Labor will recompete the Host Computer Services contract, worth $32 million.

Although industry has used the methodology for years, NASA was the first federal agency to employ mission contracting, now used at all centers except Lewis. The Air Force also uses the same type of contracts for a few centers, and other agencies are moving toward allowing the contractor to use the most efficient staff mix to meet mission data processing and communications requirements.

In addition to the prospect of winning a five-year contract, the next most significant advantage is the opportunity to provide software and hardware add-ons during the contract term. This process is called "flow-through" and enables the incumbent vendor to improve profitability in a delivery mode (GOCO) associated with low fee rates.

Vendors not involved in or allied to another vendor for SI may experience greater competition for the postimplementation support. A number of professional service firms are attracted to SI contracts because of SO prospects for five to ten years.

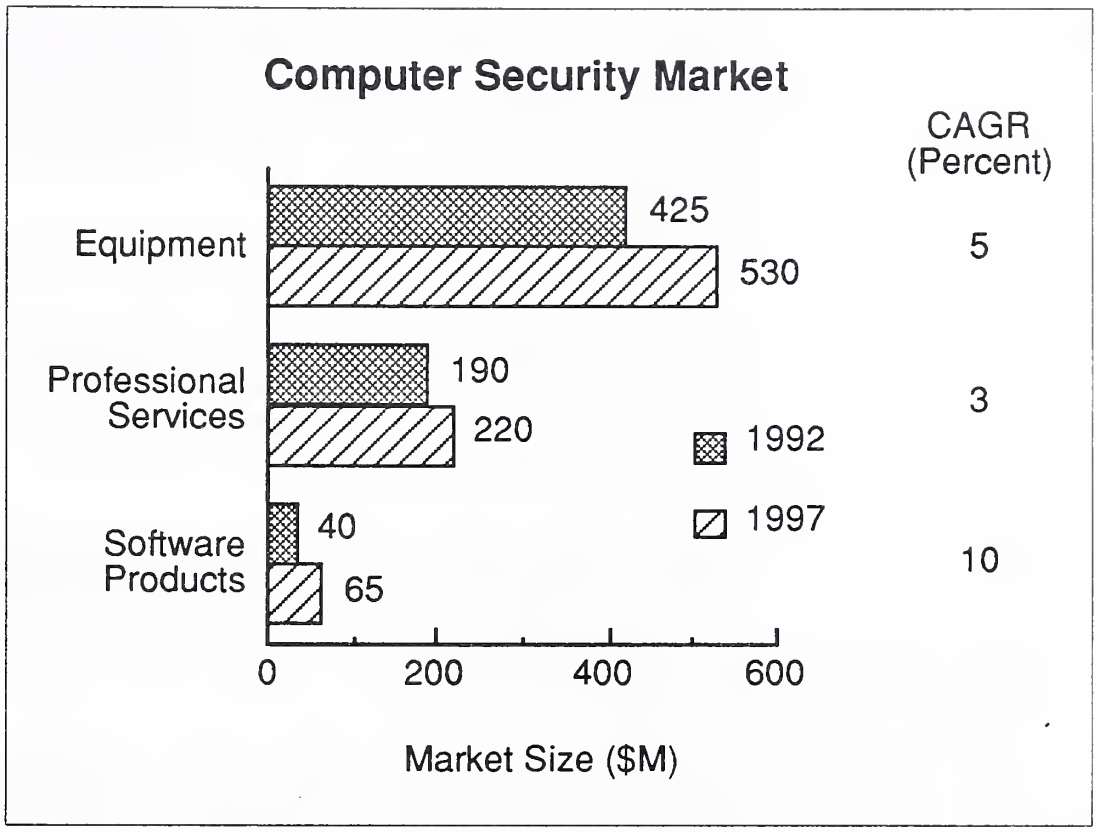
M

Computer Security

1. Overview

INPUT currently expects the market for federal computer security to improve slightly from $650 million in FY 1992 to $815 million in FY 1997, at a compound annual growth rate of 5%, as seen in Exhibit IV-17.

EXHIBIT IV-17



2. Security Elements

The current emphasis is on specialized equipment, comprising nearly 65% of the 1992 outlays. Growth is expected to be 5% CAGR through 1997, unless some agency suffers grievous harm from a security breakdown. The equipment includes computers, peripherals and communications modems that are non-radiating.

Professional services will grow at the lower CAGR of 3%, because there is not much urgency or funding to move beyond the security survey and planning stages.

OPM is providing security training to federal ADP staff, using vendors in some instances.

Attainment of software security is expected to be accomplished by the system designers and implementers of programs like the IRS Tax Modernization Program and SSA's Systems Modernization Program. Agencies like NASA established Computer Security Incident Response teams that include on-site vendor professionals.

While the software products segment is the smallest, it is expected to experience the fastest growth at 10% CAGR. The increasing availability of functional products for defining security needs and providing security measures will influence growth, provided agencies seek software solutions.

Currently, most administrators appear to prefer physical and equipment security measures. New interest in protection and recovery from computer viruses may be the key driver. Because this is treated as a borderline issue, any acquisitions in this segment are not likely to be given any publicity.

3. Trends

Although Congress mandated improved measures in the Computer Security Act of 1987, funding was only provided for development of a security plan and initiation of staff training. Subsequent budget restrictions have further delayed any significant agency responses.

Unless Congress passes follow-up legislation, with an appropriate level of funding, it is unlikely that this market will increase substantially. The agencies say that a significant and legally embarrassing incident must occur before the Administration or Congress will pay more than lip service to this Act.

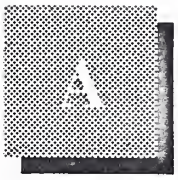
Under the Computer Security Act, support was and is provided for performing security evaluations and audits, and assisting in development of physical, electronic and software security plans.

Defense and other national security agencies continue to profess an interest in MLS (Multilevel Security) computer systems. One vendor announced the availability of an MLS product without indicating likely sales levels.

4. Network Security

Network security, consisting primarily of encryption equipment, is excluded from INPUT's forecast model because of the embedded nature of its processing. However, it still represents a major business opportunity in the federal market.

INPUT estimates this market to be over $450 million annually and expects it to remain fairly flat over the forecast period. Though demand is increasing, particularly among civilian agencies, the growing cost effectiveness of data encryption equipment is offsetting this growth, leading to the flat market size projection.



Forecast Data Bases and Reconciliation

A

Federal IT Budget Forecast Data Base

One of the features of the Federal Systems and Services Market Program (FSSMP), and earlier, the Federal Information Systems and Services Program (FISSP), is the creation of a computer-based forecast model for predicting the likely growth rates of the federal IT expenditures. The model uses the data provided in Sections 43A and 43B—*Information Resource Plans and Budget Request*—of the OMB Circular A-11 *Federal Annual Budget Request Preparation Guidelines*. This information provides the first two-year baseline of the five-year forecast.

Exhibit A-1 displays the overview of the four budget items and their components gleaned from the 43A&B documents, modified by the agency long-range plans and interviews where the data is incomplete.

The FY 1992 column displays the estimates of the agencies of the ongoing fiscal year, previously authorized by Congress.

The FY 1993 column is a summation of the requests made by the Executive Branch administrations, plus outlays planned by organizations not governed by the Amended Paperwork Reduction Act, that have not been authorized by Congress. The plans of the non-Executive Branch entities are summarized in the line called "Off-IT Budget Adjustments."

The columns titled FY 1994 to FY 1997 are INPUT's forecasts of the likely rate of growth, or decline, of the government's budget elements. A principal caveat here is that these numbers are request-based, and not yet specified by the government.

The forecast uses year-to-year growth rates established by INPUT each year (see the comments in the Introduction), and estimates of the Congressional Budget Office, Office of Management and Budget and economic projections of economic outlook groups in several agencies.

EXHIBIT A-1

Federal IT Budget Forecast, FYs 1992-1997, Data Base

Federal Government Budget OMB A-11 Categories	Total 1992 Gov't. Est.	Total 1993 Gov't. Frcst.	Total 1994 ($M)	Total 1995 ($M)	Total 1996 ($M)	Total 1997 ($M)	CAGR '92-'97 (%)
Capital Investment							
Hardware	4,694	5,412	5,585	5,810	6,045	6,335	6
Software & Other	715	780	835	905	980	1,080	9
Site	553	465	490	525	560	606	2
Subtotal	5,962	6,657	6,910	7,240	7,585	8,021	6
Personnel	5,441	5,583	5,705	5,855	6,013	6,207	3
Equipment, Rental, Space and Other Operating Costs							
Lease of Equipment	533	571	575	575	580	584	2
Space	247	271	285	305	325	351	7
Supplies & Other	948	1,067	1,100	1,135	1,180	1,230	5
Subtotal	1,728	1,909	1,960	2,015	2,085	2,165	5
Commercial Services							
ADPE Time	187	188	190	190	191	190	0
Leased Telecommunications	3,717	3,710	3,825	3,980	4,135	4,330	3
Operations & Maintenance	3,943	4,515	4,870	5,345	5,870	6,560	11
Systems Analysis & Programming	2,764	2,801	2,955	3,150	3,370	3,650	6
System Design & Engineering	11	11	10	10	10	10	-2
Studies & Other	541	882	845	805	765	715	6
Subtotal	11,163	12,107	12,695	13,485	14,341	15,455	7
Total Information Technology	24,294	26,256	27,270	28,595	30,023	31,855	6
Subtotal IT to be Contracted	17,375	19,175	20,025	21,105	22,285	23,810	7
Off-IT Budget Adjustments	358	398	430	450	470	485	6
Total to be Contracted	17,735	19,575	20,435	21,555	22,755	24,295	6

To assure a degree of compliance of the service mode/market forecasts, the data base for the federal government budget elements must be developed in greater detail. Each entry is based on formulas that are adjusted each year to track with the factors noted in the preceding years.

The evidence of how closely the model tracks expenditure patterns will be demonstrated later in this Appendix, under Forecast Reconciliation.

The most notable change of the past two years has been the decline into single-digit growth rates of the four key budget elements. Only one budget component, Operations and Maintenance, remains in the double-digit compound annual growth rate (used to describe the five-year change in expenditures as a percentage of the base-year value).

Three changes instituted in the Section 43A submissions in FY 1992 and FY 1993 will be incorporated in INPUT's model for the FYs 1993-1998 forecast. The changes include a separate line item for software leases under "Operating Costs", and under "Commercial Services", the first change is the addition of "New Technology Applications", and the gradual elimination of "System Design and Engineering". Note the low funding request for the latter in the current plans.

At present, the software lease data has been included with equipment leases, and new technology data included in the systems analysis and capital investment entries.

B

INPUT's Federal IT Expenditure Forecast Data Base

As explained in the Introduction of this report, the data compiled in the Federal IT budget model (Exhibit A-1) is dissembled and regrouped in service modes that are more familiar to both INPUT's vendor clients and the technical program managers in the agencies. These are discussed in the main body of the report and defined in Appendix B that follows.

1. Part I - Primary Service Modes

The primary service modes that closely follow the IT budget elements are listed in the Part I - IT Market Data Base in Exhibit A-2. The most significant feature of this part of the forecast model is that the summation of expected expenditures for each fiscal year equals the amount calculated as the "Total Contracted-Out Spending" for each respective year in Exhibit A-1. (If the primary service modes exceed the budget/forecast it is unlikely that the funds would be available.)

With reassembling into service modes/markets, there can be some with double-digit growth prospects, as noted in Exhibit A-2. Examples include outsourcing, software products, and within a category note the 19% CAGR of replacement computer systems, expected with the delay in approving new systems. Also note the decline in growth rates for professional services and communications/network services, much lower than projected in 1990.

EXHIBIT A-2

Federal IT Market Forecast, FYs 1992-1997, Data Base, Part I

INPUT Service Modes Contracted Portion	Total 1992 Gov't. Est.	Total 1993 Gov't. Frcst.	Total 1994 ($M)	Total 1995 ($M)	Total 1996 ($M)	Total 1997 ($M)	CAGR '92-'97 (%)
Computer Systems							
Turnkey Systems	1,090	1,235	1,275	1,330	1,370	1,385	5
New Systems	2,405	2,500	2,225	1,715	1,690	1,730	-6
Replacement Systems	1,295	1,740	2,135	2,800	2,970	3,150	19
Subtotal	4,790	5,475	5,635	5,845	6,030	6,265	6
Software Products							
Applications Software	770	855	1,010	1,175	1,310	1,480	14
Systems Software	415	460	475	505	560	635	9
Subtotal	1,185	1,315	1,485	1,680	1,870	2,115	12
Communications/Network Service							
Leased Circuits	2,460	2,455	2,625	2,810	3,005	3,215	5
Equipment	440	540	580	620	665	710	10
Professional Services	375	440	475	510	555	600	10
Network Services	1,280	1,275	1,365	1,460	1,560	1,670	5
Subtotal	4,555	4,710	5,045	5,400	5,785	6,195	6
Processing Services							
Transaction Processing	140	140	140	140	140	140	<1
Utility/Batch Process	35	35	35	35	35	35	<1
Subtotal	175	175	175	175	175	175	<1
Professional Services							
Software Development	1,320	1,365	1,435	1,525	1,600	1,695	5
Design & Consulting	400	460	470	485	505	525	6
Education & Training	305	495	475	455	430	405	6
Subtotal	2,025	2,320	2,380	2,465	2,535	2,625	5
SI - Professional Services	1,435	1,275	1,355	1,730	2,000	2,350	10
Outsourcing							
Systems Operations (COCO)	350	400	450	510	575	650	13
Systems Operations (GOCO)	1,110	1,245	1,850	1,575	1,770	1,885	11
Subtotal	1,460	1,645	2,300	2,085	2,345	2,535	12
Computer Maintenance	2,110	2,660	2,060	2,175	2,015	2,035	-1
Total Contracted-Out Spending	17,735	19,575	20,435	21,555	22,755	24,295	6

2. Part II—Alternative Markets

The primary service/delivery modes of the preceding data base do not fit the markets that most of INPUT's vendor clients track. Six additional markets are identified in greater detail in the data base shown in Exhibit A-3.

Because these markets are assembled from pieces of the so-called "primary markets," these results are not additive to those in the Part I data base (a frequent difficulty of casual users of these forecasts).

Several of these markets appear headed for double-digit growth, unless the economy and the tax base both decline. Some, like systems integration, have declined substantially from the 16%-18% foreseen in the late 1980s and 1990. Others, like electronic commerce/EDI and computer security, get a lot of press coverage but little significant funding.

There are also several other versions of this data that have been prepared for the Market Analysis Reports in the FSSMP Program. Using the OMB A-11 submission of an agency, INPUT can develop a general model of how that agency is likely to spend its money. (Since it's so political, there are no guarantees.)

Within some limits of realism, secondary market characteristics can also be identified. However, as the level of detail increases, the sources rapidly become more unreliable, even for past fiscal years.

C
Reconciliation of INPUT's 1991 and 1992 Forecasts

Outside forces can substantially change the direction of any market. In this market, the expected economic, physical and competitive factors are further skewed by domestic and international geopolitical forces that are highly unpredictable. Outside events, like the end of the Cold War, the dismantling of the USSR, Desert Storm, and a difficult presidential election complicate the forecasting process. Forecast reconciliation is used by INPUT to see how closely these factors have been considered.

Two parts of the forecasts will be considered, matching the two parts of the FYs 1992-1997 forecast data base. Both will compare the forecasts for FY 1992 and FY 1996, since these fiscal years are present in both the CY 1991 and CY 1992 forecasts

EXHIBIT A-3

Federal IT Market Forecast, FYs 1992-1997, Data Base, Part II

INPUT Service Modes	Total 1992 ($M)	Total 1993 ($M)	Total 1994 ($M)	Total 1995 ($M)	Total 1996 ($M)	Total 1997 ($M)	CAGR '92-'97 (%)
Systems Integration Market							
Professional Services	1,435	1,275	1,355	1,730	2,000	2,350	10
Equipment Systems	1,896	2,279	2,480	2,720	2,970	3,200	11
Software Products	230	296	335	390	440	505	17
Other Services	149	187	220	255	290	335	18
Subtotal	3,711	4,037	4,390	5,095	5,700	6,390	11
Office Information Systems							
Processing Services	10	10	10	10	10	10	6
Software Products	215	235	265	300	330	375	12
Professional Services	170	210	220	220	245	265	9
Turnkey Systems	90	100	110	115	125	135	8
Equipment	980	1,080	1,130	1,200	1,270	1,305	6
Subtotal	1,468	1,635	1,735	1,845	1,980	2,090	7
Electronic Commerce / EDI							
Computer Equipment	110	125	135	140	150	160	8
Software Products	60	65	75	85	95	105	12
Professional Services	20	25	30	30	30	35	12
Networks	10	10	10	10	10	10	<1
Subtotal	200	225	250	265	285	310	9
Computer Equipment Market							
Microcomputers	1,415	1,660	1,800	1,960	2,220	2,315	10
Workstations	445	540	550	640	900	1,055	19
Midsize Systems	1,325	1,585	1,490	1,575	1,800	1,860	7
Large Scale Systems	3,000	3,240	3,523	3,660	4,015	4,125	7
Supercomputers	395	430	470	510	635	715	13
Subtotal	6,580	7,455	7,833	8,345	9,570	10,070	9
Computer Security Market							
Professional Services	190	195	190	190	200	220	3
Software Products	40	45	55	60	60	65	10
Equipment	425	460	460	470	505	530	5
Subtotal	655	700	705	720	765	815	4
Computer Equipment Maintenance							
Large Scale Systems	560	755	840	910	1,060	1,230	17
Midsize Systems	840	1,070	1,290	1,400	1,705	1,905	18
PCs/Workstations	560	770	840	895	960	1,010	13
Ancillary Services	95	180	250	305	400	450	36
Subtotal	2,055	2,775	3,220	3,510	4,125	4,595	17

1. Part I Reconciliation

Part I compares the same primary service modes/markets as Exhibit A-2, which corresponds to the federal IT budget requests. Discussion will focus on those significant differences in money and as a percentage of the 1991 forecast. Each part will begin with examination of the FY 1992 near-term results and look at the out-year results for FY 1996.

For FY 1992, the most significant difference is the decline of $645 million in the communications/network services market, a 12% difference, which is explained by continued efficiencies of FTS-2000, several network contract appeals and the slowdown associated with the FTS-2000 recompetition in 1992.

Computer maintenance was also down by 11%, but with a lower base, this was about $265 million. The unexpected spurt in new system acquisitions ($315 million) reduced the expected demand. Software products was down by $125 million, a 10% decline, attributable to large discounts to maintain the government buy programs.

The variances are much larger in the FY 1996 comparison. The loss leader continues to be communications/network services, down by 16%, for a variance of $1.1 billion. It was noted in Chapter IV of this report that a lot of communications spending is occurring outside the information technology budget process. The $810 million shortfall in leased circuit expected expenditures does not track with reputed FTS-2000 revenues.

The expected shortfall of 30%, or $860 million, in professional services for systems integration was also discussed in Chapter IV. The tendency is toward more production-type systems with preset configurations and a lot of hardware, especially PCs and workstations, with much less professional help needed.

The lower results for software products will be a reflection of the FY 1992 expectations—about the same percentage, but about double the negative variance.

The resurgence in hardware acquisitions expected in the FYs 1993-1995 period is pushing all submodes, for a 2% improvement, at $140 million greater than predicted a year ago. DoD jumped hardware procurement for a "one-time"-"one-year" flurry of buying in early FY 1992, which is now not expected to run out before FY 1995, just in time for the major systems buys in Treasury and FAA.

Overall, the increase of the 1992 forecast is 30% higher than 1991 by $4 billion in FY 1992 and by 6% at $1.5 billion in FY 1996.

EXHIBIT A-4

Federal Market Forecast Reconciliation
1991 vs. 1992 Forecasts for FY 1992 and FY 1996, Part I

INPUT Service Modes	Forecast for FY 1992				Forecast for FY 1996				'91-'96 CAGR 1991 (%)	'91-'96 CAGR 1992 (%)
	1991 ($M)	1992 ($M)	Variance ($M)	Variance (%)	1991 ($M)	1992 ($M)	Variance ($M)	Variance (%)		
Processing Services	170	175	5	3	200	175	-25	-13	3	<1
Transactions	140	140	0	0	165	145	-25	-15	3	<1
Utility/Batch	30	35	5	16	35	35	0	0	3	<1
Professional Services	2,040	2,025	-15	-1	2,680	2,535	-145	-1	7	5
Software Development	1,330	1,320	-10	-1	1,865	1,600	-265	-14	9	5
Education & Training	305	305	0	0	305	430	125	41	0	6
Consulting & Design	405	400	-5	-1	510	505	-5	-1	5	6
Outsourcing	1,530	1,460	-70	-5	2,475	2,345	-130	-5	10	12
Systems Operat'ns(COCO)	365	350	-15	-4	590	575	-15	-3	10	13
Systems Operat'ns(GOCO)	1,165	1,110	-55	-5	1,880	1,770	-110	-6	10	12
Software Products	1,310	1,185	-125	-10	2,115	1,870	-245	-12	13	12
Applications	850	770	-80	-9	1,480	1,310	-170	-11	14	14
Systems	460	415	-45	-10	635	560	-75	-12	9	9
Communications/Networks	5,200	4,555	-645	-12	6,885	5,785	-1,100	-16	10	6
Leased Circuits	2,910	2,460	-450	-15	3,815	3,005	-810	-21	10	5
Professional Services	350	375	25	7	515	555	40	8	8	10
Equipment	430	440	10	2	560	665	105	19	10	10
Network Services	1,510	1,280	-230	-15	1,995	1,560	-435	-22	10	5
SI Professional Services	1,455	1,435	-20	-1	2,860	2,000	-860	-30	16	10
Computer Systems	4,575	4,790	215	5	5,890	6,030	140	2	7	6
Turnkey Systems	1,030	1,090	60	6	1,290	1,370	80	6	6	5
New Systems	2,090	2,405	315	15	1,610	1,690	80	5	-6	-6
Replacement Systems	1,455	1,295	-160	-11	2,990	2,970	-20	-1	20	19
Computer Maintenance	2,375	2,110	-265	-11	3,165	2,015	-1,150	-36	7	-1
Total Contracted Out	13,655	17,735	4,080	-5	26,270	27,755	1,485	6	18	6

2. Part II Reconciliation

This reconciliation deals with more specific markets than Part I, covering the same markets as Part II of the market forecast data base. This material is shown in Exhibit A-5, with none of the variances as great as they were in the Part I comparison, with the exception of maintenance, discussed in Part I.

EXHIBIT A-5

Federal Market Forecast Reconciliation
1991 vs. 1992 Forecasts for FY 1992 and FY 1996, Part II

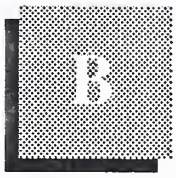
INPUT Service Modes	Forecast for FY 1992				Forecast for FY 1996				'91-'96 CAGR 1991 (%)	'91-'96 CAGR 1992 (%)
	1991 ($M)	1992 ($M)	Variance ($M)	Variance (%)	1991 ($M)	1992 ($M)	Variance ($M)	Variance (%)		
Systems Integration	3,785	3,710	-75	-2	6,635	5,700	-935	-14	16	11
Professional Services	1,455	1,435	-20	-1	2,860	2,000	-860	-30	16	10
Computer Equipment	1,890	1,895	5	0	2,950	2,970	20	1	15	11
Software Products	270	230	-40	-15	500	440	-60	-12	20	17
Other	170	150	-20	-12	325	290	-35	-11	20	18
Turnkey Systems	1,030	1,090	60	6	1,290	1,500	210	16	8	7
Office Info. Systems	1,370	1,470	100	7	1,720	1,980	260	15	8	7
Electronic Commerce/EDI	200	200	0	0	280	285	5	2	9	9
Computer Security	620	655	35	6	730	765	35	5	5	4
Computer Equipment	6,535	6,480	-55	-1	8,955	9,570	615	7	8	9
Microcomputers	1,450	1,415	-35	-2	2,035	2,220	185	9	10	10
Workstations	475	445	-30	-6	930	900	-30	-3	18	19
Mid-Size	1,390	1,325	-65	-5	1,635	1,800	165	10	6	7
Large Mainframes	2,840	2,900	60	2	3,625	4,015	390	11	7	7
Supercomputers	380	395	15	4	730	635	-95	-13	12	13
Computer Maintenance	2,480	2,055	-425	-17	4,100	4,125	25	1	13	17
Large Scale Systems	675	560	-115	-17	1,100	1,060	-40	4	12	17
Midsize Systems	960	840	-120	-13	1,700	1,705	5	0	6	18
PCs/Workstations	685	560	-125	-18	900	960	60	7	14	13
Ancillary Services	160	95	-65	-41	400	400	0	0	60	36

In Part II, the computer maintenance market lost funding included in other primary markets, resulting in a negative variance of $425 million, 17% of the 1991 forecast. As noted earlier in Chapter IV, new equipment reduced the demand for maintenance. But by FY 1996, the variance is expected to be negligible.

The remainder of the markets show relatively minor variations in the FY 1992 comparison. The net of a $360 million negative variance for the three largest markets amounts to 2% negative variance.

The largest FY 1996 negative variance of $935 million for systems integration is adequately offset by the positive variance expected in computer equipment of $615 million, in office information systems of $260 million and in turnkey systems of $210 million. The net variance of the same three largest markets in FY 1996 is a positive $515 million, which is slightly more than 2% of the 1991 base forecast.

Office information systems and turnkey systems are also expected to see strong positive variances in FY 1996 over the 1991 forecast base. The FY 1996 period still has a lot of unpredictable conditions, not the least of which will be determined by the result of the presidential election.



Definitions

The definitions in this appendix include hardware, software, services and telecommunications categories to accommodate the range of information systems and services programs described in this report.

Alternate service mode terminology employed by the federal government in its procurement process is defined along with INPUT's regular terms of reference, as shown in Exhibit B-1.

The federal government's unique, non-technical terminology, associated with applications, documentation, budgets, authorization and the procurement/acquisition process, is included in Appendix C, Glossary of Federal Acronyms.

A
Overall Definitions and Analytical Framework

Information Services - Computer/telecommunications-related products and services that are oriented toward the development or use of information systems. Information services typically involve one or more of the following:

- Processing of specific applications using vendor-provided systems (called *Processing Services*)
- A combination of hardware, packaged software and associated support services that will meet a specific application processing need (called *Turnkey Systems*)
- Packaged software (called *Software Products*)
- People services that support users in developing and operating their own information systems (called *Professional Services*)

- Bundled combinations of products and services where the vendor assumes responsibility for the development of a custom solution to an information system problem (called *Systems Integration*)

- Services that provide operation and management of all or a significant part of a user's information systems functions under a long-term contract (called *Systems Operations)*

- Services associated with the delivery of information in electronic form—typically network-oriented services such as value-added networks, electronic mail and document interchange, on-line data bases, on-line news and data feeds, videotex, etc. (called *Network Services*)

In general, the market for information services does not involve providing equipment to users. The exception is where the equipment is bundled as part of an overall service offering such as a turnkey system, a systems operations contract or a systems integration project.

The information services market also excludes pure data transport services (i.e., data or voice communications circuits). However, where information transport is associated with a network-based service (e.g., EDI or VAN services), or cannot be feasibly separated from other bundled services (e.g., some systems operations contracts), the transport costs are included as part of the services market.

The analytical framework of the *Information Services Industry* consists of the following interacting factors: overall and industry-specific business environment (trends, events and issues); technology environment; user information system requirements; size and structure of information services markets; vendors and their products, services and revenues; distribution channels; and competitive issues.

All *Information Services Market* forecasts are estimates of *User Expenditures* for information services. When questions arise about the proper place to count these expenditures, INPUT addresses them from the user's viewpoint: expenditures are categorized according to what users perceive they are buying.

By focusing on user expenditures, INPUT avoids two problems that are related to the distribution channels for various categories of services:

- Double counting, which can occur by estimating total vendor revenues when there is significant reselling within the industry (e.g., software sales to turnkey vendors for repackaging and resale to users)

- Missed counting, which can occur when sales to users go through indirect channels such as mail order retailers.

Delivery Modes are defined as specific products and services that satisfy a given user need. While *Market Sectors* specify *who* the buyer is, *Delivery Modes* specify *what* the user is buying.

Of the eight delivery modes defined by INPUT, five are considered primary products or services:

- Processing Services
- Network Services
- Professional Services
- Applications Software Products
- Systems Software Products

The remaining three delivery modes represent combinations of these products and services, bundled together with equipment, management and/or other services.

- Turnkey Systems
- Systems Operations
- Systems Integration

Section B describes the delivery modes and their structure in more detail.

Outsourcing is defined as the contracting of information systems (IS) functions to outside vendors. Outsourcing should be viewed as the opposite of *insourcing*: anything that IS management has considered feasible to do internally (e.g., data center operations, applications development and maintenance, network management, training, etc.) is a potential candidate for outsourcing.

IS has always bought systems software, as it is infeasible for companies to develop it internally. However, all other delivery modes represent functions or products that IS management could choose to perform or develop in-house. Viewed this way, outsourcing is the result of a make-or-buy decision, and the outsourcing market covers any product or service where the vendor must compete against the client firm's own internal resources.

B

Industry Structure and Delivery Modes

1. Services Categories

Exhibit B-1 presents the structure of the information services industry. Several of the delivery modes can be grouped into higher-level *Service Categories,* based on the kind of problem the user needs to solve. These categories are:

- *Business Application Solutions (BAS)* - prepackaged or standard solutions to common business applications. These applications can be either industry-specific (e.g., mortgage loan processing for a bank), cross-industry (e.g., payroll processing) or generic (e.g., utility time sharing). In general, BAS services involve minimal customization by the vendor, and allow the user to handle a specific business application without having to develop or acquire a custom system or system resources. The following delivery modes are included under BAS:

  - Processing Services
  - Applications Software Products
  - Turnkey Systems

- *Systems Management Services (SMS)* - services that assist users in developing systems or operating/managing the information systems function. Two key elements of SMS are the customization of the service to each individual user and/or project, and the potential for the vendor to assume significant responsibility for management of at least a portion of the user's information systems function. The following delivery modes are included under SMS:

  - Systems Operations
  - Systems Integration

Each of the remaining three delivery modes represents a separate service category:

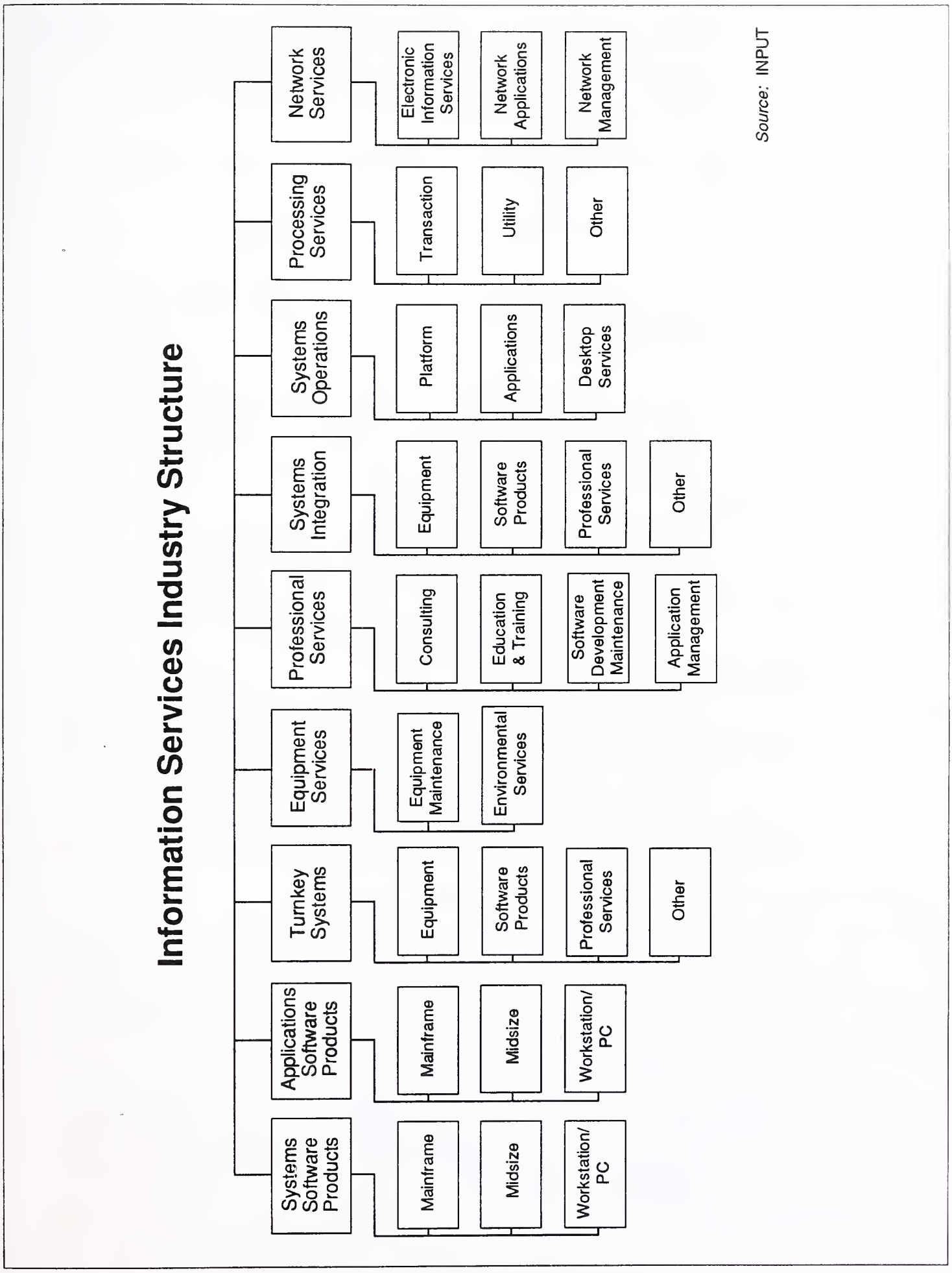
- Professional Services
- Network Services
- Systems Software Products

Note: These service categories are a new concept introduced in 1990. They are purely an aggregation of lower-level delivery mode data. They do not change the underlying delivery modes or industry structure.

2. Software Products

There are many similarities between the applications and systems software delivery modes. Both involve user purchases of software packages for in-house computer systems. Included are both lease and purchase expenditures, as well as expenditures for work performed by the vendor to implement or maintain the package at the user's site. Vendor-provided training or support in operation and use of the package, if bundled in the software pricing, is also included here.

EXHIBIT B-1



Expenditures for work performed by organizations other than the package vendor are counted in the category of professional services. Fees for work related to education, consulting and/or custom modification of software products are counted as professional services, provided such fees are charged separately from the price of the software product itself.

Software products have several subcategories, as indicated below and shown in Exhibit B-2.

- Systems Software Products

  Systems software products enable the computer/communications system to perform basic machine-oriented or user interface functions. These products include:

  - *Systems Control Products* - Software programs that function during application program execution to manage computer system resources and control the execution of the application program. These products include operating systems, emulators, network control, library control, windowing, access control and spoolers.

  - *Operations Management Tools* - Software programs used by operations personnel to manage the computer system and/or network resources and personnel more effectively. Included are performance measurement, job accounting, computer operation scheduling, disk management utilities and capacity management.

  - *Applications Development Tools* - Software programs used to prepare applications for execution by assisting in designing, programming, testing, and related functions. Included are traditional programming languages, 4GLs, data dictionaries, data base management systems, report writers, project control systems, CASE systems and other development productivity aids. Also included are system utilities (e.g., sorts) which are directly invoked by an applications program.

- Applications Software Products

  - *Industry-Specific Applications Software Products* - Software products that perform functions related to solving business or organizational needs unique to a specific vertical market and sold to that market only. Examples include demand deposit accounting, MRPII, medical recordkeeping, automobile dealer parts inventory, etc.

  - *Cross-Industry Applications Software Products* - Software products that perform a specific function that is applicable to a wide range of industry sectors. Applications include payroll and human resource systems, accounting systems, word processing and graphics systems, spreadsheets, etc.

EXHIBIT B-2

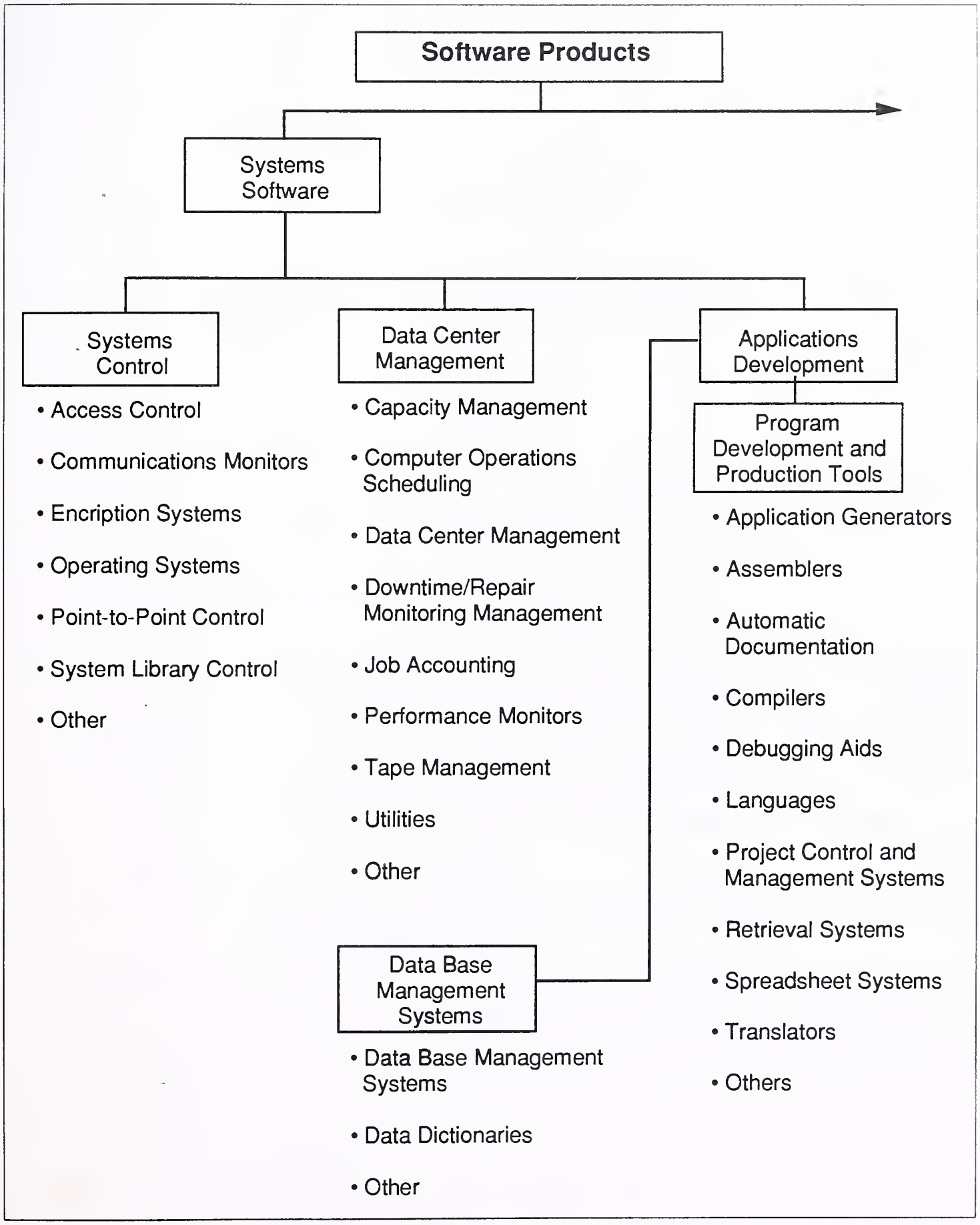
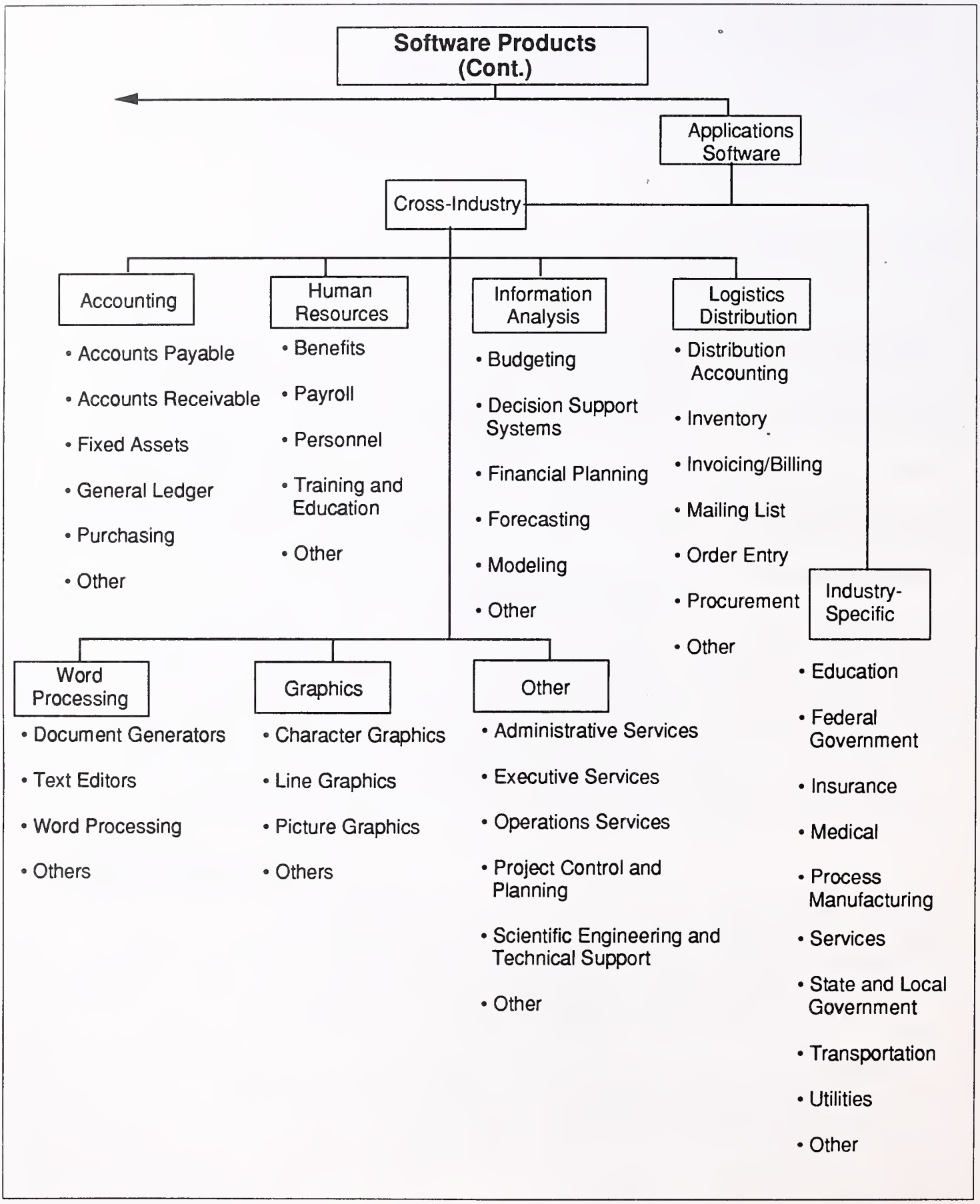


EXHIBIT B-2 (CONT.)



3. Turnkey Systems

A turnkey system is an integration of equipment (CPU, peripherals, etc.), systems software, and packaged or custom application software into a single system developed to meet a specific set of user requirements. Value added by the turnkey system vendor is primarily in the software and support services provided. Most CAD/CAM systems and many small business systems are turnkey systems. Turnkey systems utilize standard computers and do not include specialized hardware such as word processors, cash registers, process control systems or embedded computer systems for military applications.

Hardware vendors that combine software with their own general-purpose hardware are not classified by INPUT as turnkey vendors. Their software revenues are included in the appropriate software category.

Most turnkey systems are sold through channels known as value-added resellers.

- Value-Added Reseller (VAR): A VAR adds value to computer hardware and/or software and then resells it to an end user. The major value added is usually applications software for a vertical or cross-industry market, but also includes many of the other components of a turnkey systems solution, such as professional services.

Turnkey systems are divided into two categories:

- *Industry-Specific Systems* - systems that serve a specific function for a given industry sector, such as automobile dealer parts inventory, medical recordkeeping or discrete manufacturing control systems.

- *Cross-Industry Systems* - systems that provide a specific function that is applicable to a wide range of industry sectors, such as financial planning systems, payroll systems or personnel management systems.

4. Processing Services

This category includes transaction processing, utility processing and other processing services.

- *Transaction Processing*: Client uses vendor-provided information systems—including hardware, software and/or data networks—at vendor site or customer site to process transactions and update client data bases. Transactions may be entered in one of four modes:

- *Interactive* - Characterized by the interaction of the users with the system for data entry, transaction processing, problem solving and report preparation: the user is on-line to the programs/files stored on the vendor's system.

- *Remote Batch* - Where the user transmits batches of transaction data to the vendor's system, allowing the vendor to schedule job execution according to overall client priorities and resource requirements.

- *Distributed Services* - Where users maintain portions of an application data base and enter or process some transaction data at their own site, while also being connected through communications networks to the vendor's central systems for processing other parts of the application.

- *Carry-in Batch* - where users physically deliver work to a processing services vendor.

- *Utility Processing:* Vendor provides basic software tools (language compilers, assemblers, DBMSs, graphics packages, mathematical models, scientific library routines, etc.), generic applications programs and/or data bases, enabling clients to develop their own programs or process data on vendor's system.

- *Other Processing Services:* Vendor provides services—usually at vendor site—such as scanning and other data entry services, laser printing, computer output microfilm (COM), CD preparation and other data output services, backup and disaster recovery, etc.

5. Systems Operations

Systems operations involves the operation and management of all or a significant part of the user's information systems functions under a long-term contract. These services can be provided in either of two distinct submodes:

- *Professional Services:* The vendor provides personnel to operate client-supplied equipment. Prior to 1990, this was a submode of the Professional Services delivery mode.

- *Processing Services:* The vendor provides personnel, equipment and (optionally) facilities. Prior to 1990, this was a submode of the Processing Services delivery mode.

Systems operations vendors now provide a wide variety of services in support of existing information systems. The vendor can plan, control, provide, operate, maintain and manage any or all components of the user's information systems (equipment, networks, systems and/or application software), either at the client's site or the vendor's site. Systems operations can also be referred to as "resource management" or "facilities management".

There are two general levels of systems operations:

- Platform/network operations - where the vendor operates the computer system and/or network without taking responsibility for the applications
- Application operations - where the vendor takes responsibility for the complete system, including equipment, associated telecommunications networks and applications software.

Note: Systems Operations is a new delivery mode introduced in 1990.

6. Systems Integration (SI)

Systems integration is a business offering that provides a complete solution to an information system, networking or automation requirements through the custom selection and implementation of a variety of information system products and services. A systems integrator is responsible for the overall management of a systems integration contract and is the single point of contact and responsibility to the buyer for the delivery of the specified system function, on schedule and at the contracted price.

To be included in the information services market, systems integration projects must involve some application processing component. In addition, the majority of cost must be associated with information systems products and/or services.

The systems integrator will perform, or manage others who perform, most or all of the following functions:

- Program management, including subcontractor management
- Needs analysis
- Specification development
- Conceptual and detailed systems design and architecture
- System component selection, modification, integration and customization

- Custom software design and development
- Custom hardware design and development
- Systems implementation, including testing, conversion and post-implementation evaluation and tuning
- Life cycle support, including
  - System documentation and user training
  - Systems operations during development
  - Systems maintenance
- Financing

7. Professional Services

This category includes consulting, education and training, and software development.

- *Consulting:* services include management consulting (related to information systems), information systems consulting, feasibility analysis and cost-effectiveness studies, and project management assistance. Services may be related to any aspect of information systems, including equipment, software, networks and systems operations.
- *Education and Training*: Products and services related to information systems and services for the professional end user, including computer-aided instruction, computer-based education and vendor instruction of user personnel in operations, design, programming and documentation.
- *Software Development*: Services include user requirements definition, systems design, contract programming, documentation and implementation of software performed on a custom basis. Conversion and maintenance services are also included.

8. Network Services

Network services typically include a wide variety of network-based functions and operations. Their common thread is that most of these functions could not be performed without network involvement. Network services is divided into two major segments: Electronic Information Services, which involve selling information to the user, and Network Applications, which involve providing some form of enhanced transport service in support of a user's information processing needs.

- Electronic Information Services

Electronic information services are data bases that provide specific information via terminal- or computer-based inquiry, including items such as stock prices, legal precedents, economic indicators, periodical literature, medical diagnosis, airline schedules, automobile valuations, etc. The terminals used may be computers themselves, such as communications servers or personal computers. Users typically inquire into and extract information from the data bases. Although users may load extracted data into their own computer systems, the electronic information vendor provides no data processing or manipulation capability and the users cannot update the vendor's data bases.

The two kinds of electronic information services are:

- *On-line Data Bases* - Structured, primarily numerical data on economic and demographic trends, financial instruments, companies, products, materials, etc.

- *News Services* - Unstructured, primarily textual information on people, companies, events, etc.

While electronic information services have traditionally been delivered via networks, there is a growing trend toward the use of CD ROM optical disks to support or supplant on-line services, and these optical disk-based systems are included in the definition of this delivery mode.

- *Network Applications*

  - *Value-Added Network Services (VAN Services)* - VAN services are enhanced transport services which involve adding such functions as automatic error detection and correction, protocol conversion, and store-and-forward message switching to the provision of basic network circuits.

While VAN services were originally provided only by specialized VAN carriers (Tymnet, Telenet, etc.), today these services are also offered by traditional common carriers (AT&T, Sprint, etc.). Meanwhile, the VAN carriers have also branched into the traditional common carriers' markets and are offering unenhanced basic network circuits as well.

INPUT's market definition covers VAN services only, but includes the VAN revenues of all types of carriers.

- *Electronic Data Interchange (EDI)* - Application-to-application exchange of standardized business documents between trade partners or facilitators. This exchange is commonly performed using VAN services. Specialized translation software is typically employed to convert data from organizations' internal file formats to EDI interchange standards; this software may be provided as part of the VAN service or may be resident on the organization's own computers.

- *Electronic Information Exchange (EIE)* - Also known as Electronic Mail (E-Mail), EIE involves the transmission of messages across an electronic network managed by a services vendor, including facsimile transmission (FAX), voice mail, voice messaging, and access to Telex, TWX and other messaging services. This also includes bulletin board services.

- *Other Network Services* - This segment contains videotex and pure network management services. Videotex is actually more a delivery mode than an application. Its prime focus is on the individual as a consumer or in business. These services provide interactive access to data bases and offer the inquirer the capability to send as well as receive information for such purposes as home shopping, home banking, travel reservations, etc.

Network management services included here must involve the vendor's network and network management systems as well as people. People-only services, or services that involve the management of networks as part of the broader task of managing a user's information processing functions are included in Systems Operations.

C
Hardware/Hardware Systems

Hardware - Includes all computer and telecommunications equipment that can be separately acquired with or without installation by the vendor and not acquired as part of an integrated system.

- *Peripherals* - Includes all input, output, communications and storage devices (other than main memory) that can be connected locally to the main processor, and generally cannot be included in other categories such as terminals.

- *Input Devices* - Includes keyboards, numeric pads, card readers, light pens and track balls, tape readers, position and motion sensors, and analog-to-digital converters.

- *Output Devices* - Includes printers, CRTs, projection television screens, micrographics processors, digital graphics and plotters

- *Communication Devices* - Includes modem, encryption equipment, special interfaces and error control

- *Storage Devices* - Includes magnetic tape (reel, cartridge and cassette), floppy and hard disks, solid state (integrated circuits), and bubble and optical memories

Terminals - Three types of terminals are described below:

- *User Programmable* - Also called intelligent terminals, including the following:

  - Single-station or standalone
  - Multistation, shared processor
  - Teleprinter
  - Remote batch

- *User Nonprogrammable*

  - Single-station
  - Multistation, shared processor
  - Teleprinter

- *Limited Function* - Originally developed for specific needs, such as point-of-sale (POS), inventory data collection, controlled access and other applications

Hardware Systems - Includes all processors from microcomputers to supercomputers. Hardware systems may require type- or model-unique operating software to be functional, but this category excludes applications software and peripheral devices, other than main memory and processors or CPUs not provided as part of an integrated (turnkey) system.

- *Microcomputer* - Combines all of the CPU, memory, and peripheral functions of an 8-, 16-, or 32-bit computer on a chip in various forms including:

  - Integrated circuit package

  - Plug-in boards with increased memory and peripheral circuits

  - Console including keyboard and interfacing connectors

  - Personal computer with at least one external storage device directly addressable by the CPU

  - An embedded computer that may take a number of shapes or configurations

- *Workstations* - High-performance, desktop, single-user computers employing (mostly) Reduced Instruction Set Computing (RISC). Workstations provide integrated, high-speed, local network-based services such as data base access, file storage and back-up, remote communications and peripheral support. Typical workstation products are provided by Apollo (now a unit of Hewlett-Packard), Sun, Altos, DEC (the MicroVAX) and IBM. These products usually cost more than $15,000. However, at this writing many companies have recently announced sizable price cuts.

- *Midsize Systems* - Describe superminicomputers and the more traditional business minicomputers. Due to steadily improving design and technology, the latter have outgrown traditional definitions (which defined small systems as providing 32-bit to 64-bit word lengths at prices ranging from $15,000 to $350,000). Increasingly, minicomputers and workstations meet the 32-bit definition, and may go beneath the $15,000 lower price limit. Typical midrange systems include IBM System/3X, 43XX, AS/400 and 937X product lines, DEC PDP and VAX families (excluding MicroVAX families), and competitive products from a wide range of vendors, including HP, Data General, Wang, AT&T, Prime Concurrent, Gould, Unisys, NCR, Bull, Harris, Tandem, Stratus, and many others.

- *Large Computer* - Presently centered on storage controllers, but likely to become bus-oriented and to consist of multiple processors or parallel processor. Intended for structured mathematical and signal processing and typically used with general-purpose, Von Neumann-type processors for system control. This term usually refers to traditional mainframes and supercomputers.

- *Supercomputer* - High-powered processors with numerical processing throughput that is significantly greater than the fastest general-purpose computers, with capacities in the 100-500 million floating point operations per second (MFLOPS) range. Newer supercomputers, with burst modes over 500 MFLOPS, main storage size up to 10 million words and on-line storage in the one-to-four gigabyte class, are labeled Class V to Class VII in agency long-range plans. Supercomputers fit in one of two categories:

  - Real Time - Generally used for signal processing in military applications

  - Non-Real Time - For scientific use in one of three configurations:

    · Parallel processors
    · Pipeline processor
    · Vector processor

Supercomputer - Is also applied to micro, mini, and large mainframe computers with performance substantially higher than attainable by Von Neumann architectures.

- *Embedded Computer* - Dedicated computer system designed and implemented as an integral part of a weapon, weapon system or platform; critical to a military or intelligence mission such as command and control, cryptological activities or intelligence activities. Characterized by military specifications (MIL SPEC) appearance and operation, limited but reprogrammable applications software, and permanent or semipermanent interfaces. These systems may vary in capacity from microcomputers to parallel processor computer systems.

D

General Definitions

Analog - Signal or transmission type with continuous waveform representation.

ASCII - American National Standard Code for Information Interchange—Eight-bit code with seven data bits and one parity bit.

Asynchronous - Communications operation (such as transmission) without continuous timing signals. Synchronization is accomplished by appending signal elements to the data.

Bandwidth - Range of transmission frequencies that can be carried on a communications path; used as a measure of capacity.

Baud - Number of signal events (discrete conditions) per second. Typically used to measure modem or terminal transmission speed.

Byte - Usually equivalent to the storage required for one alphanumeric character (i.e., one letter or number).

CBX - Computerized Branch Exchange—A PABX based on a computer system, implying programmability and usually voice and data capabilities.

Central Processing Unit (CPU) - The arithmetic and control portion of a computer; i.e., the circuits controlling the interpretation and execution of computer instructions.

Centrex - Central office telephone services that permit local circuit switching without installation of customer premises equipment. Could be described as shared PBX service.

Circuit Switching - A process that, usually on demand, connects two or more network stations and permits exclusive circuit use until the connection is released; typical of the voice telephone network, where a circuit is established between the caller and the called party.

CO - Central Office—Local telco site for one or more exchanges.

CODEC - Coder/decoder—Equivalent to modem for digital devices.

Constant Dollars - Growth forecasts in constant dollars make no allowance for inflation or recession. Dollar value based on the year of the forecast unless otherwise indicated.

Computer System - The combination of computing resources required to perform the designed functions. May include one or more CPUs, machine room peripherals, storage systems and/or applications software.

CPE - Customer Premises Equipment—DCE or DTE located at a customer site rather than at a carrier site such as the local telephone company. May include switchboards, PBX, data terminals and telephone answering devices.

CSMA/CD - Carrier Sense Multiple Access/Collision Detect—Contention protocol used in local-area networks, typically with a multipoint configuration.

Current Dollars - Estimates or values expressed in current-year dollars which, for forecasts, would include an allowance for inflation.

Data Encryption Standard (DES) - Fifty-six-bit key, one-way encryption algorithm adopted by NIST in 1977, implemented through hardware ("S-boxes") or software. Designed by IBM with NSA guidance.

Datagram - A self-contained packet of information that does not depend on the contents of preceding or following packets and has a finite length.

DCA - IBM's Document Content Architecture—Protocols for specifying document (text) format that are consistent across a variety of hardware and software systems within IBM's DISOSS.

DCE - Data Circuit-terminating Equipment—Interface hardware that couples DTE to a transmission circuit or channel by providing functions to establish, maintain and terminate a connection, including signal conversion and coding.

DDCMP - Digital Data Communications Message Protocol—Data link protocol used in Digital Equipment Company's DECNET.

DECNET - Digital Equipment Company's network architecture.

Dedicated Circuit - A permanently established network connection between two or more stations; contrast with switched circuit.

DEMS - Digital Electronic Message Service—Nationwide common carrier digital networks that provide high-speed, end-to-end, two-way transmission of digitally encoded information using the 10.6 GHz band.

DIA - IBM's Document Interchange Architecture—Protocols for transfer of documents (text) between different hardware and software systems within IBM's DISOSS.

Digital - Signal or transmission type using discontinuous, discrete quantities to represent data.

DISOSS - IBM's DIStributed Office Support System—Office automation environment, based on DCA and DIA, which permits document (text) transfer between different hardware and software systems without requiring subsequent format or content revision.

Distributed Data Processing - The development of programmable intelligence in order to perform a data processing function where it can be accomplished most effectively through computers and terminals arranged in a telecommunications network adapted to the user's needs.

DTE - Data Terminal Equipment—Hardware which is a data source, link or both, such as video display terminals that convert user information into data transmission, and reconvert data signals into user information.

EBCDIC - Extended Binary Coded Decimal Interchange Code—Eight-bit code typically used in IBM mainframe environments.

EFT - Electronic Funds Transfer.

Encryption - Electric, code-based conversion of transmitted data to provide security and/or privacy of data between authorized access points.

End User - One who is using a product or service to accomplish his or her own functions. The end user may buy a system from the hardware supplier(s) and do his or her own programming, interfacing and installation. Alternately, the end user may buy a turnkey system from a systems house or hardware integrator, or may buy a service from an in-house department or external vendor.

Engineering Change Notice (ECN) - Product improvements after production.

Engineering Change Order (ECO) - The follow-up to ECNs, including parts and a bill of materials to effect the change in the hardware.

Equipment Operators - Individuals operating computer control consoles and/or peripheral equipment (BLS definition).

Erasable Disk - A type of disk that allows users to erase data previously written. Erasable disks used for applications where data may need to be updated periodically.

Ethernet - Local-area network developed by Xerox PARC using baseband signaling, CSMA/CD protocol and coaxial cable to achieve a 10-mbps data rate.

Facsimile - Transmission and reception of graphic data, usually fixed images of documents, through scanning and conversion of a picture signal.

FDM - Frequency Division Multiplexing—A multiplexing method that permits multiple access by assigning different frequencies of the available bandwidth to different channels.

FEP - Front-End Processor—Communications concentrator such as the IBM 3725 or COMTEN 3690 used to interface communications lines to host computers.

Field Engineer (FE) - Field engineer, customer engineer, serviceperson and maintenance person are used interchangeably and refer to the individual who responds to a user's service call to repair a device or system.

Full-Duplex - Bi-directional communications, with simultaneous, two-way transmission.

General-Purpose Computer System - A computer designed to handle a wide variety of problems. Includes machine room peripherals, systems software and small business systems.

Half-Duplex - Bi-directional communications, but only in one direction at a time.

Hardware Integrator - Develops system interface electronics and controllers for the CPU, sensors, peripherals and all other ancillary hardware components. The hardware integrator also may develop control system software in addition to installing the entire system at the end-user site.

HDLC - High-level Data Link Control.

Hertz- Number of signal oscillations (cycles) per second, abbreviated Hz.

IBM Token Ring - IBM's local-area network using baseband signalling and operating at 4 mbps on twisted-pair copper wire. Actually a combination of star and ring topologies—IEEE 802.5-compatible.

IDN - Integrated Digital Network—Digital switching and transmission; part of the evolution to ISDN.

Independent Suppliers - Suppliers of machine room peripherals, though usually not suppliers of general-purpose computer systems.

Information Processing - Data processing as a whole, including use of business and scientific computers.

Installed Base - Cumulative number or value (cost when new) of computers in use.

Interconnection - Physical linkage between devices on a network.

Interoperability - The capability to operate with other devices on a network. Different from interconnection, which merely guarantees a physical network interface.

ISDN - Integrated Services Digital Network—Completely digital, integrated voice and nonvoice public network service. Not clearly defined through any existing standards, although FCC and other federal agencies are developing CCITT recommendations.

Keypunch Operators - Individuals operating keypunch machines (similar to electric typewriters) to transcribe data from source materials onto punch cards.

Lease Line - Permanent connection between two network stations. Also known as dedicated or non-switched line.

Machine Repairers - Individuals who install and periodically service computer systems.

Machine Room Peripherals - Peripheral equipment generally located close to the central processing unit.

Mainframe - The central processing unit (CPU or units in a parallel processor) of a computer that interprets and executes computer (software) instructions of 32 bits or more.

MAP - Manufacturing Automation Protocol—Seven-layer communications standard for factory environments promoted by General Motors/ EDS. Adopts IEEE 802.2 and IEEE 802.4 standards plus OSI protocols for other layers of the architecture.

Mean Time to Repair - The mean of elapsed times from the arrival of the field engineer on the user's site to the time when the device is repaired and returned to user service.

Mean Time to Respond - The mean of elapsed times from the user call for services and the arrival of the field engineer on the user's site.

Message - A communication intended to be read by a person. The quality of the received document need not be high, only readable. Graphic materials are not included.

MMFS - Manufacturing Messaging Format Standard—Application-level protocol included within MAP.

Modem - A device that encodes information into electronically transmittable form (MOdulator) and restores it to original analog form (DEModulator).

NCP - Network Control Program—Software used in IBM 3705/3725 FEPs for control of SNA networks.

Node - Connection point of three or more independent transmission points that may provide switching or data collection.

Off-Line - Pertaining to equipment or devices that can function without direct control of the central processing unit.

On-Line - Pertaining to equipment or devices under direct control of the central processing unit.

Optical Disk - Storage device that uses laser technology to record data. Optical disks provide high storage capacity, but cannot be overwritten.

OSI - ISO reference model for Open Systems Interconnection—Seven-layer architecture for application, presentation, session, transport, network, data link, and physical services and equipment.

OSI Application Layer - Layer 7, providing end-user applications services for data processing.

OSI Data Link Layer - Layer 2, providing transmission protocols, including frame management, link flow control and link initiation/release.

OSI Network Layer - Layer 3, providing call establishment and clearing control through the network nodes.

OSI Physical Layer - Layer 1, providing the mechanical, electrical, functional and procedural characteristics to establish, maintain and release physical connections to the network.

OSI Presentation Layer - Layer 6, providing data formats and information such as data translation, data encoding/decoding and command translation.

OSI Session Layer - Layer 5, establishes, maintains, and terminates logical connections for the transfer of data between processes.

OSI Transport Layer - Layer 4, providing end-to-end terminal control signals such as acknowledgments.

Overseas - Not within the geographical limits of the continental United States, Alaska, Hawaii and U.S. possessions.

PABX - Private Automated Branch Exchange—Hardware that provides automatic (electro-mechanical or electronic) local circuit switching on a customer's premises.

PAD - Packet Assembler-Disassembler—A device that enables DTE not equipped for packet switching operation to operate on a packet switched network.

PBX - Private Branch Exchange—Hardware that provides local circuit switching on the customer premise.

PCM - Pulse-Code Modulation—Modulation involving conversion of a waveform from analog to digital form through coding.

PDN - Public Data Network—A network established and operated by a recognized private operating agency, a telecommunications administration or other agency for the specific purpose of providing data transmission services to the public.

Peripherals - Any unit of input/output equipment in a computer system, exclusive of the central processing unit.

PPM - Pulse Position Modulation.

Private Network - A network established and operated for one user or user organization.

Programmers - Persons mainly involved in designing, writing and testing computer software programs

Protocols - The rules for communication system operation that must be followed if communication is to be effected. Protocols may govern portions of a network or service. In digital networks, protocols are digitally encoded as instructions to computerized equipment.

Public Network - A network established and operated for more than one user with shared access, usually available on a subscription basis. See related international definition of PDN.

Read-Only - A type of disk that is prerecorded and can be used for retrieving data. A read-only disk cannot be overwritten. A read-only system will retrieve and display stored data, but the system cannot alter the stored data.

Read/Write - A type of disk that can be read and written upon. A read/write system will read and display stored data and alter data already recorded.

Scientific Computer System - A computer system designed to process structured mathematics (such as Fast Fourier Transforms), and complex, highly redundant information (such as seismic data, sonar data and radar), with large, on-line memories and very high-capacity output.

SDLC - Synchronous Data Link Control—IBM's data link control for SNA. Supports a subset of HDLC modes.

SDN - Software-Defined Network.

Security - Physical, electrical and computer (digital) coding procedures to protect the contents of computer files and data transmission from inadvertent or unauthorized disclosure to meet the requirements of the Privacy Act and national classified information regulations

Service Delivery Point - The location of the physical interface between a network and customer/user equipment

Simplex - Unidirectional communications.

Smart Box - A device for adapting existing DTE to new network standards such as OSI. Includes PADs and protocol convertors, for example.

SNA - Systems Network Architecture—Seven-layer communications architecture designed by IBM. Layers correspond roughly but not exactly to OSI model.

Software - Computer programs

Supplies - Includes materials associated with the use of operations of computer systems, such as printer paper, keypunch card, disk packs, and tapes.

Switched Circuit - Temporary connection between two network stations established through dial-up procedures.

Synchronous - Communications operation with separate, continuous clocking at both sending and receiving stations.

Systems Analyst - Individual who analyzes problems to be converted to a programmable form for application to computer systems.

Systems House - Vendor that acquires, assembles and integrates hardware and software into a total system to satisfy the data processing requirements of an end user. The vendor also may develop systems software products for license to end users. The systems house vendor does not manufacture mainframes.

Systems Integrator - Systems house vendor that develops systems interface electronics, applications software and controllers for the CPU, peripherals and ancillary subsystems that may have been provided by a contractor or the government (GFE). This vendor may either supervise or perform the installation and testing of the completed system.

T1 - Bell System designation for 1.544 mbps carrier capable of handling 24 PCM voice channels.

TDM - Time Division Multiplexing—A multiplexing method that interleaves multiple transmissions on a single circuit by assigning a different time slot to each channel.

Token Passing - Local-area network protocol that allows a station to transmit only when it has the "token," an empty slot on the carrier.

TOP - Technical Office Protocol—Protocol developed by Boeing Computer Services to support administrative and office operations as complementary functions to factory automation implemented under MAP.

Turnkey System - System composed of hardware and software integrated into a total system designed to fulfill completely the processing requirements of a single application.

Twisted-Pair Cable - Communications cabling consisting of pairs of single-strand metallic electrical conductors, such as copper wires, typically used in building telephone wiring and some LANs.

Verification and Validation - Process for examining and testing applications and special systems software to verify that it operates on the target CPU and performs all of the functions specified by the user.

Voice-Grade - Circuit or signal in the 300-3300 Hz bandwidth typical of the public telephone system, nominally a 4 Khz user.

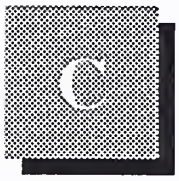
VTAM - Virtual Telecommunications Access Method—Host-resident communications software for SNA networks.

WORM - Write-Once, Read-Many—A type of disk that can be created one time. Once written on, the disk can only be read—otherwise data will be destroyed.

Write-Once - A type of disk that can be created one time. Once written on, the disk can only be read. It cannot be rewritten.

E
Other Considerations

When questions arise as to the proper place to count certain user expenditures, INPUT addresses the questions from the user viewpoint. Expenditures are then categorized according to the users' perception of the purchase.



Glossary of Federal Acronyms

The federal government's procurement language uses a combination of acronyms, phrases and words that is complicated by different agency definitions and interpretations. The government also uses terms of accounting, business, economics, engineering and law with new applications and technology.

Acronyms and contract terms that INPUT encountered most often in program documentation and interviews for this report are included here, but this glossary should not be considered all-inclusive. Federal procurement regulations (DAR, FPR, FAR, FIRMR, FPMR) and contract terms listed in RFIs, RFPs, and RFQs provide applicable terms and definitions.

Federal agency acronyms have been included to the extent they are employed in this report.

A

Federal Acronyms

AAS	Automatic Addressing System.
AATMS	Advanced Air Traffic Management System.
ACS	Advanced Communications Satellite (formerly NASA 30/20 GHz Satellite Program).
ACT-1	Advanced Computer Techniques (Air Force).
ACWP	Actual Cost of Work Performed
Ada	DoD high-order language.
ADA	Airborne Data Acquisition.
ADL	Authorized Data List.
ADNET	Anti-Drug Network.
ADS	Automatic Digital Switches (DCS).
AFA	Air Force Association.
AFCEA	Armed Forces Communications Electronics Association.
AFR	Air Force Regulation
AGE	Aerospace Ground Equipment.
AIP	Array Information Processing.

AIPC	Automated Information Processing Center
AIS	Automated Information System.
AMD	Acquisition Management Directorate.
AMPE	Automated Message Processing Equipment.
AMPS	Automated Message Processing System.
AMSDL	Acquisition Management Systems Data List.
ANG	Army National Guard
AP(P)	Advance Procurement Plan.
Appropriation	Congressionally approved funding for authorized programs and activities of the Executive Branch.
APR	Agency Procurement Request.
ARB	Acquisition Review Board.
ARPANET	DARPA network of scientific computers.
ASP	Aggregated Switch Procurement
ASR	Acquisition Strategy Report.
ATLAS	Abbreviated Test Language for All Systems (for ATE—Automated Test Equipment).
Authorization	In the legislative process programs, staffing, and other routine activities must be approved by Oversight Committees before the Appropriations Committee will approve the money from the budget.
AUSA	Association of the U.S. Army.
BA	Basic Agreement or Budget Authority.
BAFO	Best And Final Offer.
Base level	Procurement, purchasing, and contracting at the military installation level.
BCA	Board of Contract Appeals.
BCE	Baseline Cost Estimate.
Benchmark	Method of evaluating ability of a candidate computer system to meet user requirements.
Bid protest	Objection (in writing, before or after contract award) to some aspect of a solicitation by a valid bidder.
BML	Bidders Mailing List—qualified vendor information filed annually with federal agencies to automatically receive RFPs and RFQs in areas of claimed competence.
BOA	Basic Ordering Agreement.
B&P	Bid and Proposal—vendor activities in response to government solicitation/ specific overhead allowance.
BPA	Blanked Purchase Agreement.
Budget	Federal Budget, proposed by the President and subject to Congressional review.
BY	Budget Year or Base Year
C^2	Command and Control.
C^3	Command, Control and Communications.
C^4	Command, Control, Communications and Computers.
C^3I	Command, Control, Communications and Intelligence.
CAB	Contract Adjustment Board or Contract Appeals Board.
CADE	Computer-Aided Design and Engineering.
CADS	Computer-Assisted Display Systems.

CAIS	Computer-Assisted Instruction System.
CALS	Computer-Aided Logistics Support.
CAPS	Command Automation Procurement Systems.
CAS	Contract Administration Services or Cost Accounting Standards.
CASB	Cost Accounting Standards Board.
CASP	Computer-Assisted Search Planning.
CBD	*Commerce Business Daily*—U.S. Department of Commerce publication listing government contract opportunities and awards.
CBO	Congressional Budget Office.
CCEP	Commercial Comsec Endorsement Program
CCDR	Contractor Cost Data Reporting.
CCN	Contract Change Notice or Configuration Change Notice.
CCPDS	Command Center Processing and Display Systems.
CCPO	Central Civilian Personnel Office.
CDA	Central Design Activity.
CDR	Critical Design Review.
CDRL	Contractor Data Requirement List.
CFE	Contractor-Furnished Equipment.
CFM	Contractor Furnished Material.
CFR	Code of Federal Regulations.
CICA	Competition in Contracting Act (1984).
CIG	Computerized Interactive Graphics.
CIM	Corporate Information Management or Center for Information Management.
CINCs	Commanders-in-Chief.
CIR	Cost Information Reports.
CM	Configuration Management.
CMI	Computer-Managed Instruction.
CNI	Communications, Navigation and Identification.
CO	Contracting Office, Contract Offices, or Change Order.
COC	Certificate of Competency (administered by the Small Business Administration), or Certificate of Compliance.
COCO	Contractor-Owned, Contractor-Operated.
CODSIA	Council of Defense and Space Industry Associations.
COMSAT	Communications Satellite Corporation.
CONUS	Continental United States.
COP	Capability Objective Package.
COSMIC	COmputer Software Management Information Center (NASA).
COTR	Contracting Officer's Technical Representative.
COTS	Commercial Off-The-Shelf (Commodities).
CP	Communications Processor.
CPAF	Cost-Plus-Award-Fee Contract.
CPFF	Cost-Plus-Fixed-Fee Contract.
CPIF	Cost-Plus-Incentive-Fee Contract.
CPR	Cost Performance Reports.
CPSR	Contractor Procurement System Review.
CR	Cost Reimbursement (Cost-Plus Contract).
CSA	Combat or Computer Systems Architecture.
CSIF	Communications Services Industrial Fund.

C/SCSC	Cost/Schedule Control System Criteria (also called "C-Spec").
CWAS	Contractor Weighted Average Share in Cost Risk.
CWBS	Contract Work Breakdown Structure.
DAB	Defense Acquisition Board.
DABBS	Defense Acquisition Bulletin Board System.
DAC	Defense Acquisition Circular.
DAL	Data Accession List.
DAR	Defense Acquisition Regulations.
DARC	Defense Acquisition Regulatory Council.
DARPA	Defense Advanced Research Projects Agency.
DAS	Data Acquisition System.
DBHS	Data Base Handling System.
DBOF	Defense Business Operating Fund.
DCA	Defense Communications Agency (see DISA).
DCAA	Defense Contract Audit Agency.
DCAS	Defense Contract Administration Services.
DCASR	DCAS Region.
DCC	Digital Control Computer.
DCS	Defense Communications System.
DDA	Dynamic Demand Assessment (Delta Modulation).
DDC	Defense Documentation Center.
DDL	Digital Data Link—A segment of a communications network used for data transmission in digital form.
DDS	Defense Distribution System.
DECCO	DEfense Commercial Communications Office.
DECEO	DEfense Communications Engineering Office.
D&F	Determination and Findings—required documentation for approval of a negotiated procurement.
DFARS	DoD FAR Supplement.
DFAS	Defense Finance and Accounting Service.
DIA	Defense Intelligence Agency.
DISA	Defense Information Systems Agency (Formerly DCA).
DHHS	Department of Health and Human Services.
DIDS	Defense Integrated Data Systems.
DISC	Defense Industrial Supply Center.
DITSO	Defense Information Technology Systems Office.
DLA	Defense Logistics Agency.
DMA	Defense Mapping Agency.
DMR	Defense Management Review.
DMRD	Defense Management Review Decision.
DNA	Defense Nuclear Agency.
DO	Delivery Order.
DOA	Department of Agriculture (also USDA).
DOC	Department of Commerce.
DoD	Department of Defense.
DoDD	Department of Defense Directive.
DOE	Department of Energy.

DOI	Department of Interior.
DOJ	Department of Justice.
DOS	Department of State.
DOT	Department of Transportation.
DPA	Delegation of Procurement Authority (granted by GSA under FPRs).
DPC	Defense Procurement Circular.
DPF	Defense Processing Facility.
DQ	Definite Quantity Contract.
DQ/PL	Definite Quantity Price List Contract.
DR	Deficiency Report.
DRFP	Draft Request For Proposal.
DSCS	Defense Satellite Communication System.
DSN	Defense Switched Network.
DSP	Defense Support Program (WWMCCS).
DSS	Defense Supply Service.
DTC	Design-To-Cost.
DTIC	Defense Technical Information Center.
DTN	Defense Transmission Network.
DVA	Department of Veterans Affairs.
ECP	Engineering Change Proposal.
ED	Department of Education.
EEO	Equal Employment Opportunity.
8(a) Set-Aside	Agency awards direct to Small Business Administration for direct placement with a small, socially/economically disadvantaged company.
EMC	Electro-Magnetic Compatibility.
EMCS	Energy Monitoring and Control System.
EO	Executive Order—Order issued by the President.
EOQ	Economic Ordering Quantity.
EPA	Economic Price Adjustment.
EPA	Environmental Protection Agency.
EPMR	Estimated Peak Monthly Requirement.
EPS	Emergency Procurement Service (GSA) or Emergency Power System.
ETR	Estimated Time to Repair.
ESTSC	Energy Science and Technology Software Center (DOE).
EUC	End-User Computing, especially in DoD.
FA	Formal Advertising.
FAC	Federal Acquisition Circular.
FAR	Federal Acquisition Regulations.
FCA	Functional Configuration Audit.
FCC	Federal Communications Commission.
FCDC	Federal Contract Data Center.
FCPC	Federal Computer Products Center.
FCRC	Federal Contract Research Center.
FDPC	Federal Data Processing Center.
FDR	Formal Design Review.
FEDSIM	Federal (Computer) Simulation Center (GSA).

FEMA	Federal Emergency Management Agency.
FFP	Firm Fixed-Price Contract (also Lump Sum Contract).
FFRDC	Federally Funded Research & Development Center.
FIPR	Federal Information Processing Resource.
FIPS	Federal Information Processing Standard.
FIPS PUBS	FIPS Publications.
FIRMR	Federal Information Resource Management Regulations.
FMS	Foreign Military Sales.
FOC	Full Operating Capability.
FOIA	Freedom of Information Act.
FP	Fixed-Price Contract.
FPAF	Fixed-Price Award Fee.
FPIF	Fixed-Price Incentive Fee.
FP-L/H	Fixed-PriceLabor/Hour Contract.
FP-LOE	Fixed-PriceLevel-Of-Effort Contract.
FPMR	Federal Property Management Regulations.
FPR	Federal Procurement Regulations.
FSC	Federal Supply Classification.
FSG	Federal Supply Group.
FSN	Federal Stock Number.
FSS	Federal Supply Schedule or Federal Supply Service (GSA).
FSTS	Federal Secure Telecommunications System.
FT Fund	A revolving fund, designated as the Federal Telecommunications Fund, used by GSA to pay for GSA-provided common-user services, specifically including the current FTS and proposed FTS 2000 services.
FTSP	Federal Telecommunications Standards Program administered by NCS; Standards are published by GSA.
FTS	Federal Telecommunications System.
FTS 2000	Replacement of the Federal Telecommunications System.
FY	Fiscal Year.
FYDP	Five-Year Defense Plan.
G&A	General and Administrative (Expense).
GAO	General Accounting Office.
GFE	Government-Furnished Equipment.
GFM	Government-Furnished Material.
GFY	Government Fiscal Year (October to September).
GIDEP	Government-Industry Data Exchange Program.
GOCO	Government OwnedContractor Operated.
GOGO	Government OwnedGovernment Operated.
GOSIP	Government Open Systems Interconnection Profile.
GPO	Government Printing Office.
GPS	Global Positioning System.
GRH	Gramm-Rudman-Hollings Act (1985), also called Gramm-Rudman Deficit Control.
GS	General Schedule.
GSA	General Services Administration.
GSBCA	General Services Administration Board of Contract Appeals.

HAC	House Appropriations Committee.
HASC	House Armed Services Committee.
HCFA	Health Care Financing Administration.
HHS	(Department of) Health and Human Services.
HOL	Higher Order Language.
HPA	Head of Procuring Activity.
HSDP	High-Speed Data Processors.
HUD	(Department of) Housing and Urban Development.
I-CASE	Integrated Computer-Aided Software Engineering.
IAR	Senior IRM Official.
ICA	Independent Cost Analysis.
ICAM	Integrated Computer-Aided Manufacturing.
ICE	Independent Cost Estimate.
ICP	Inventory Control Point.
ICST	Institute for Computer Sciences and Technology, National Bureau of Standards, Department of Commerce.
IDA	Institute for Defense Analysis.
IDAMS	Image Display And Manipulation System.
IDEP	Interservice Data Exchange Program.
IDIQ	Indefinite Delivery-Indefinite Quantity.
IDN	Integrated Data Network.
IFB	Invitation For Bids.
IOC	Initial Operating Capability.
IOI	Internal Operating Instructions.
IPS	Integrated Procurement System.
IQ	Indefinite Quantity Contract.
IR&D	Independent Research & Development.
IRM	Information Resources Management.
IXS	Information Exchange System.
IV&V	Independent Verification & Validation.
JCS	Joint Chiefs of Staff.
JCALS	Joint Computer-Aided Logistics Support.
JFMIP	Joint Financial Management Improvement Program.
JIT	Just-In-Time.
JOCIT	Jovial Compiler Implementation Tool.
JPO	Joint Program Office.
JSIPS	Joint Systems Integration Planning Staff.
JSOP	Joint Strategic Objectives Plan.
JSOR	Joint Service Operational Requirement.
JUMPS	Joint Uniform Military Pay System.
JWAM	Joint WWMCCS ADP Modernization (Program).
LC	Letter Contract.
LCC	Life Cycle Cost.
LCMP	Life Cycle Management Procedures (DD7920.1).
LCMS	Life Cycle Management System.

L-H	Labor-Hour Contract.
LOI	Letter of Intent; Letter of Instruction.
LRPE	Long-Range Procurement Estimate.
LRIRP	Long-Range Information Resource Plan.
LTD	Live Test Demonstration.
LSI	Large-Scale Integration.
MAISRC	Major Automated Information Systems Review Council (DoD).
MANTECH	MANufacturing TECHnology.
MAPS	Multiple Address Processing System.
MAP/TOP	Manufacturing Automation Protocol/Technical and Office Protocol.
MASC	Multiple Award Schedule Contract.
MDA	Multiplexed Data Accumulator.
MENS	Mission Element Need Statement or Mission Essential Need Statement (see DD-5000.1 Major Systems Acquisition).
MILSCAP	Military Standard Contract Administration Procedures.
MIL SPEC	Military Specification.
MIL STD	Military Standard.
MIPR	Military Interdepartmental Purchase Request.
MLS	Multilevel Security.
MNF	Multi-National Force.
MOD	Modification.
MOL	Maximum Ordering Limit (Federal Supply Service).
MPC	Military Procurement Code.
MTBF	Mean-Time-Between-Failures.
MTTR	Mean-Time-To-Repair.
MYP	Multi-Year Procurement.
NARDIC	Navy Research and Development Information Center.
NASA	National Aeronautics and Space Administration.
NBS	National Bureau of Standards (replaced by NIST).
NCA	National Command Authorities.
NCMA	National Contract Management Association.
NCS	National Communications System (evolving to DISN).
NDI	Non-Development Item.
NICRAD	Navy-Industry Cooperative Research and Development.
NIP	Notice of Intent to Purchase.
NIST	National Institute of Science and Technology (was NBS).
NMCS	National Military Command System.
NSA	National Security Agency.
NSEP	National Security and Emergency Preparedness.
NSF	National Science Foundation.
NSIA	National Security Industrial Association.
NTIA	National Telecommunications and Information Administration of the Department of Commerce; (replaced the Office of Telecommunications Policy in 1970).
NTIS	National Technical Information Service.

Obligation	"Earmarking" of specific funding for a contract from committed agency funds.
OA	Obligational Authority.
OBE	Overcome By Events.
OCS	Office of Contract Settlement.
OFCC	Office of Federal Contract Compliance.
Off-Site	Services to be provided near but not in government facilities.
OFMP	Office of Federal Management Policy (GSA).
OFPP	Office of Federal Procurement Policy.
OIRM	Office of Information Resources Management.
O&M	Operations & Maintenance.
OMB	Office of Management and Budget.
O,M&R	Operations, Maintenance and Readiness.
On-Site	Services to be performed on a government installation or in a specified building.
OPM	Office of Procurement Management (GSA) or Office of Personnel Management.
Options	Sole-source additions to the base contract for services or goods to be exercised at the government's discretion.
OSADBU	Office of Small and Disadvantaged Businesses.
OSHA	Occupational Safety and Health Act.
OSI	Open System Interconnect.
OSP	Offshore Procurement.
OTA	Office of Technology Assessment (Congress).
Out-Year	Proposed funding for fiscal years beyond the budget year (next fiscal year).
P-1	FY Defense Production Budget.
P3I	Pre-Planned Product Improvement (program in DoD).
PAR	Procurement Authorization Request or Procurement Action Report.
PAS	Pre-Award Survey.
PASS	Procurement Automated Source System.
PCO	Procurement Contracting Officer.
PDA	Principal Development Agency.
PDM	Program Decision Memorandum.
PDR	Preliminary Design Review.
PIR	Procurement Information Reporting.
PME	Performance Monitoring Equipment.
PMP	Purchase Management Plan.
PO	Purchase Order or Program Office.
POE	Panel Of Experts.
POM	Program Objective Memorandum.
POSIX	Portable Open System Interconnection Exchange.
POTS	Purchase of Telephone Systems.
PPBS	Planning, Programming, Budgeting System.
PR	Purchase Request or Procurement Requisition.
PRA	Paperwork Reduction Act.
PS	Performance Specification—alternative to a Statement of Work, when work to be performed can be clearly specified.

QA	Quality Assurance.
QAO	Quality Assurance Office.
QBL	Qualified Bidders List.
QMCS	Quality Monitoring and Control System (DoD software).
QMR	Qualitative Material Requirement (Army).
QPL	Qualified Products List.
QRC	Quick Reaction Capability.
QRI	Quick Reaction Inquiry.
R-1	FY Defense RDT&E Budget.
RAM	Reliability, Availability and Maintainability; Random Access Memory.
RC	Requirements Contract.
R&D	Research and Development.
RDA	Research, Development and Acquisition.
RDD	Required Delivery Date.
RD&E	Research, Development and Engineering.
RDF	Rapid Deployment Force.
RDT&E	Research, Development, Test and Engineering.
RFB	Request For Bid.
RFI	Request For Information.
RFP	Request For Proposal.
RFQ	Request For Quotation.
RFTP	Request For Technical Proposals (Two-Step).
ROC	Required Operational Capability.
ROI	Return On Investment.
RSI	Rationalization, Standardization and Interoperability.
RTAS	Real-Time Analysis System.
RTDS	Real-Time Display System.
SA	Supplemental Agreement.
SAC	Senate Appropriations Committee.
SADBU	Small and Disadvantaged Business Utilization.
SAR	Selected Acquisition Report.
SASC	Senate Armed Services Committee.
SBA	Small Business Administration.
SB Set-Aside	Small Business Set-Aside contract opportunities with bidders limited to certified small businesses.
SCA	Service Contract Act (1964 as amended).
SCN	Specification Change Notice.
SDB	Small/Disadvantaged Business.
SDI	Strategic Defense Initiative.
SDIO	Strategic Defense Initiative Office.
SDN	Secure Data Network.
SDR	System Design Review.
SEC	Securities and Exchange Commission.
SE&I	Systems Engineering and Integration.
SETA	Systems Engineering/Technical Assistance.
SETS	Systems Engineering/Technical Support.

SIBAC	Simplified Intragovernmental Billing and Collection System.
SIC	Standard Industrial Classification.
SIMP	Systems Integration Master Plan.
SIOP	Single Integrated Operations Plan.
Sole Source	Contract award without competition.
Solicitation	Invitation to submit a bid.
SOR	Specific Operational Requirement.
SOW	Statement of Work.
SSA	Source Selection Authority (DoD).
SSAC	Source Selection Advisory Council.
SSEB	Source Selection Evaluation Board.
SSO	Source Selection Official (NASA).
STINFO	Scientific and Technical Information Program—Air Force/NASA.
STU	Secure Telephone Unit.
SWO	Stop-Work Order.
Synopsis	Brief description of contract opportunity in CBD after D&F and before release of solicitation.
TA/AS	Technical Assistance/Analysis Services.
TCP/IP	Transmission Control Protocol/Internet Protocol.
TEMPEST	Studies, inspections and tests of unintentional electromagnetic radiation from computer, communication, command and control equipment that may cause unauthorized disclosure of information; usually applied to DoD and security agency testing programs.
TILO	Technical and Industrial Liason Office—Qualified Requirement Information Program—Army.
TM	Time and Materials contract.
TOA	Total Obligational Authority (Defense).
TOD	Technical Objective Document.
TQM	Total Quality Management.
TR	Temporary Regulation (added to FPR, FAR).
TRACE	Total Risk Assessing Cost Estimate.
TRCO	Technical Representative of the Contracting Offices.
TREAS	Department of Treasury.
TRM	Technical Reference Model.
TRP	Technical Resources Plan.
TVA	Tennessee Valley Authority.
UCAS	Uniform Cost Accounting System.
UPS	Uniform Procurement System.
USA	U.S. Army.
USAF	U.S. Air Force.
USC	United States Code.
USCG	U.S. Coast Guard.
USMC	U.S. Marine Corps.
USN	U.S. Navy.
U.S.C.	United States Code.
USPS	United States Postal Service.

USRRB	United States Railroad Retirement Board.
VA	Veterans Affairs Department.
VE	Value Engineering.
VHSIC	Very High-Speed Integrated Circuits.
VIABLE	Vertical Installation Automation Baseline (Army).
VICI	Voice Input Code Identifier.
VTC	Video Teleconferencing.
WAM	WWMCCS ADP Modernization Program.
WBS	Work Breakdown Structure.
WGM	Weighted Guidelines Method.
WIN	WWMCCS Intercomputer Network.
WITS	Washington Interagency Telecommunications System.
WIS	WWMCCS Information Systems.
WPI	Wholesale Price Index.
WS	Work Statement—Offerer's description of the work to be done (proposal or contract).
WWMCCS	World-Wide Military Command and Control System.

B

General and Industry Acronyms

ADAPSO	Association of Data Processing Service Organization, now the Computer Software and Services Industry Association. (See ITAA).
ADP	Automatic Data Processing.
ADPE	Automatic Data Processing Equipment.
ANSI	American National Standards Institute.
BOC	Bell Operating Company.
CAD	Computer-Aided Design.
CAM	Computer-Aided Manufacturing.
CASE	Computer-Aided Software Engineering.
CBEMA	Computer and Business Equipment Manufacturers Association.
CCIA	Computers and Communications Industry Association.
CCITT	Comite Consultatif Internationale de Télégraphique et Téléphonique; Committee of the International Telecommunication Union.
COBOL	COmmon Business-Oriented Language.
COS	Corporation for Open Systems.
CPU	Central Processor Unit.
DMBS	Data Base Management System.
DRAM	Dynamic Random Access Memory.
EIA	Electronic Industries Association.
EPROM	Erasible Programmable Read-Only Memory.

IEEE	Institute of Electrical and Electronics Engineers.
ISDN	Integrated Services Digital Networks.
ISO	International Organization for Standardization; voluntary international standards organization and member of CCITT.
ITAA	Information Technology Association of America (Formerly ADAPSO).
ITU	International Telecommunication Union.
LSI	Large-Scale Integration.
MFJ	Modified Final Judgement.
PROM	Programmable Read-Only Memory.
RBOC	Regional Bell Operating Company.
UNIX	AT&T Proprietary Operating System.
UPS	Uninterruptable Power Source.
VAR	Value-Added Reseller.
VLSI	Very Large-Scale Integration.
WORM	Write-Once-Read-Many-Times.

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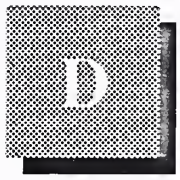

Policies, Regulations, and Standards

A

OMB Circulars

A-11	Preparation and Submission of Budget Estimates.
A-49	Use of Management and Operating Contracts.
A-71	Responsibilities for the Administration and Management of Automatic Data Processing Activities.
A-109	Major Systems Acquisitions.
A-120	Guidelines for the Use of Consulting Services.
A-121	Cost Accounting, Cost Recovery and Integrated Sharing of Data Processing Facilities.
A-123	Internal Control Systems.
A-127	Financial Management Systems.
A-130	Management of Federal Information Resources.
A-131	Value Engineering.

B

GSA Publications

The FIRMR as published by GSA is the primary regulation for use by federal agencies in the management, acquisition and use of both ADP and telecommunications information resources.

C

DoD Directives

DD-5000.1	Major System Acquisitions.
DD-5000.2	Major System Acquisition Process.
DD-5000.11	DoD Data Administration (C3I).
DD-5000.31	Interim List of DoD-Approved, High-Order Languages.
DD-5000.35	Defense Acquisition Regulatory Systems.
DD-5200.1	DoD Information Security Program.
DD-5200.28	Security Requirements for Automatic Data Processing (ADP) Systems.

DD-5200.28-M	Manual of Techniques and Procedures for Implementing, Deactivating, Testing and Evaluating Secure Resource Sharing ADP Systems.
DD-7920.2	Major Automated Information Systems Approval Process.
DD-7935	Automated Data Systems (ADS) Documentation.
DoDD 3405.1	Computer Programming Language Policy
DoDD 5000.11	DoD Data Administration (C31)
DoDI 5000.12	Data Elements and Data Codes Standardization Procedure
DoDI 5000.18	Implementation of Standard Data Elements and Related Features
DoDD 5105.19	Defense Information Systems Agency
DoDD 5110.4	Washington Headquarters Services
DoDD 5118.3	Comptroller of the Department of Defense
DoDD 5137.1	Assistant Secretary of Defense (Command, Control, Communications and Intelligence)
DoDD 7740.1	DoD Information Resources Management Program
DoD 7740.1-G	DoD ADP Internal Control Guideline
DoDD 7740.2	Automated Information System (AIS) Strategic Planning
DoDI 7740.3	Information Resources Management (IRM) Review Program
DoDD 7750.5	Management and Control of Information Requirements
DoDI 7750.7	DoD Forms Management Program
DoDI 7920.2-M	Automated Information Systems (AIS) Life-Cycle Manual
DoDI 7920.4	Baselining of Automated Information Systems (AISs)
DoDI 7920.5	Management of End-User Computing (EUC)
DoDI 7930.1	Information Technology Users Group Program
DoDI 7930.2	ADP Software Exchange and Release
DoDD 7950.1	Automated Data Processing Resources Management
DoD 7950.1-M	Defense Automated Resources Management Manual of Information Requirements

D

Standards

ADCCP	Advanced Data Communications Control Procedures; ANSI Standard X3.66 of 1979; also NIST FIPS 71.
CCITT G.711	International PCM standard.
CCITT T.0	International standard for classification of facsimile apparatus for document transmission over telephone-type circuits.
DEA-1	Proposed ISO standard for data encryption based on the NIST DES.
EIA RS-170	Monochrome video standard.
EIA RS-170A	Color video standard.
EIA RS-464	EIA PBX standards.
EIA RS-465	Standard for Group III facsimile.
EIA RS-466	Facsimile standard; procedures for document transmission in the General Switched Telephone Network.

EIA RS-232-C	EIA DCE to DTE interface standard using a 25-Pin connector; similar to CCITT V-24.
EIA RS-449	New EIA standard DTE to DCE interface which replaces RS-232-C.
FED-STD 1000	Proposed federal standard for adoption of the full OSI reference model.
FED-STD 1026	Federal Data Encryption Standard (DES) adopted in 1983; also FIPS 46.
FED-STD 1041	Equivalent to FIPS 100.
FED-STD 1061	Group II facsimile standard (1981).
FED-STD 1062	Federal standard for Group III facsimile; equivalent to EIA RS-465.
FED-STD 1063	Federal facsimile standard; equivalent to EIA RS-466.
FED-STDs 1005,	Federal standards for DCE coding and 1005A-1008 modulation.
FIPS 46	NIST Data Encryption Standard (DES).
FIPS 81	DES Modes of Operation.
FIPS 100	NIST standard for packet-switched networks; subset of 1980 CCITT X.25.
FIPS 107	NIST standard for local-area networks, similar to IEEE 802.2 and 802.3.
FIPS 146	Government Open Systems Interconnection (OSI) Profile (GOSIP).
FIPS 151	NIST POSIX (Portable Operating System Interface for UNIX) standard.
IEEE 802.2	OSI-Compatible IEEE standard for data-link control in local-area networks.
IEEE 802.3	Local-area network standard similar to Ethernet.
IEEE 802.4	OSI-compatible standard for token bus local-area networks.
IEEE 802.5	Local-area networks standard for token ring networks.
IEEE P1003.1	POSIX standard, similar to FIPS 151.
MIL-STD-	Physical interface protocol similar to RS-232 and 188-114CRS-449.
MIL-STD-1777	IP-Internet protocol.
MIL-STD-1778	TCP - Transmission Control Protocol.
MIL-STD-1780	File transfer protocol.
MIL-STD-1781	Simple mail transfer protocol (electronic mail).
MIL-STD-1782	TELNET - virtual terminal protocol.
MIL-STD-1815A	Ada programming language standard.
SVID	UNIX System Interface Definition.
X.12	ANSI standard for electronic data interchange
X.21	CCITT standard for interface between DTE and DCE for synchronous operation on public data networks.
X.25	CCITT standard for interface between DTE and DCE for terminals operating in the packet mode on public data networks.
X.75	CCITT standard for links that interface different packet networks.
X.400	ISO application-level standard for the electronic transfer of messages (electronic mail).

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